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Uterine Fibroid Symptom Severity and Impact on Health-Related Quality of Life Among African American Women

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Abstract

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MSPH, Walden University, 2006

MSW, Clark Atlanta University, 1996

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

A disproportionate number of African American women are at increased risk for uterine fibroid tumors (UF) compared to their Caucasian, Asian, and Hispanic counterparts. Researchers have indicated that women diagnosed with UF can have a poorer health-related quality of life (HRQOL) when compared to women who do not have a diagnosis of UF. The overall aim of this study was to explore the impact of UF symptoms on the HRQOL of African American women. A quantitative, cross-sectional design was employed utilizing the revised version of Wilson and Cleary's model of HRQOL. A sample was gathered of 80 participants who were African American women between age 30 and 45 years with a current diagnosis of UF. Linear and multiple hierarchical regressions were performed to determine the relationship among UF symptom severity and HRQOL based on 6 subscales of HRQOL (as measured by the UFS-QOL). There was a statistically significant association between symptom severity, the 6 subscale variables of HRQOL, and employment. No significant associations were observed with age, family history (hx) of UF diagnosis, body mass index, general health perception, overall quality of life, and symptom severity. The social change implication for this study is to provide information that can direct health care providers in the development of health maintenance programs that are sensitive to the needs of African American women diagnosed with UF. In addition it will promote the need for public health professionals and medical organizations to increase the availability of information related to UF symptoms and the impact of UF symptoms on HRQOL among women.

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Dedication

This paper is dedicated to the memory of my mother, the late Sharon Diane Ford: your spirit is ever present in my life; I am who I am because of YOU, and I strive daily to make you proud of me up there in heaven. Next, I would like to dedicate this paper to my neice, Cayden Brooks, my nephews, Rashad Ford and Marquice Ford, and my young cousins the “Clark Clan”. I pray that I have demonstrated to you with my action(s) that you should never ever give up on your dreams, always strive to reach your goals, and remain passionate about all that you hold dear. Special dedication in memory of my soror and friend, T. S. Polite, I #PRESS, because you pressed.

To the many women who have been diagnosed with Uterine Fibroids, I pray that I have shed light on your struggles and encourage women suffering with UF to tell their stories. Let us continue to work together to bring more attention to the concerns faced by women diagnosed with UF.

Acknowledgements

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Last, I would like to acknowledge my life long friends and co-workers for your supportive ear, advice, and encouragement, BLESS YOU!!!

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Chapter 1: Introduction

Introduction

Uterine leiomyomas or uterine fibroid (UF) tumors are reported to be one of the most common forms of tumors for women in the United States (Davis et al., 2009; Flake, Andersen, & Dixon, 2003) and identified as the fifth most commonly diagnosed gynecological condition for women of reproductive age (Faerstein, Szklo, & Rosenshein, 2001; Office of Research on Women's Health [ORWH], 2006). In addition, researchers have identified UF as the leading indication for hysterectomies among African American and Caucasian women in the United States (Flynn, Jamison, Datta, & Myers, 2006; National Institutes of Health [NIH], 2006). Moorehead and Conrad (2001) found that the rates of UF diagnoses among African American women were higher when compared with women from all other racial backgrounds. As of 2011, African American women were diagnosed up to three to nine times more often when compared to Caucasian women (NIH, 2011). More specifically, African American women are identified as a "high risk" population for developing UFs (Wise, Palmer, Stewart, & Rosenberg, 2005b). Not only are African American women more likely to be diagnosed with UF compared to Caucasian women, African American women are diagnosed with UF at earlier ages (Davis et al., 2009; Wise et al., 2005b), have more tumors, and experience more symptomatic tumors at the time of diagnosis (Davis et al., 2009; Hyuck et al., 2008; Kjerulff, Lagenberg, & Sieden,1996). Current research findings reflect a disproportionate number of African American women are diagnosed with and are treated for UF (Davis et al., 2009; NIH, 2011; ORWH, 2006; Wise et al., 2005b). There is a disparity in the number of African American women who are diagnosed with UF, the age at which

African American women are diagnosed, and the symptoms that are experienced by African American women when compared to their racial counterparts. Therefore, there was a need for more investigation into how UFs are affecting African American women.

It is important to note that not all women diagnosed with UF experience symptoms. The NIH (2006) stated many women do not know they have UF, implying the prevalence of UF may be more than what has been reported in the past. Mauskopf, Flynn, Thieda, Spalding, and Duchane (2005) reported that although a smaller percentage of women in the United States are diagnosed with UF when compared to other gynecological disorders, 35% to 50% of those women diagnosed seek treatment because of the symptoms associated with UF. Women diagnosed with UF who experience prominent symptoms often seek treatment because of the difficulty they encounter with managing the symptoms effectively and the negative burden UF symptoms can have on health-related quality of life (HRQOL).

HealthRelated Quality of Life

HRQOL is a multidimensional, dynamic concept that encompasses the physical, social, and psychological aspects associated with a particular disease or treatment (Ferrans, Zerwic, Wilbur, & Lawson, 2005; Williams, Jones, Mauskopf, Spalding, & Duchane, 2006). The term HRQOL is often used interchangeably with the term *quality of life* within research (Ferrans et al., 2005), suggesting that the two terms are synonymous. Although quality of life is generally used to describe an individual’s sense of happiness or satisfaction with life (Ferrans & Powers, 1992), HRQOL describes the effects of health, illness, and treatment on overall quality of life or simply the impact of disease on important areas of an individual’s life (Ferrans et al., 2005; Kimmel, 2000; Phillips, Davies, & White, 2001). In the past, researchers such as Lerner and Levine (1994) implied that HRQOL refers to a group of health consequences that interfer with an individual's ability to complete usual daily activities. However, more recently researchers have expanded their view of the concept to include the impact of health on the functional status, psychological status, overall well-being, and social functioning of an individual (Huget, Kaplan, & Feeny, 2008; Jakobsoon & Hallberg, 2006; Kaplan, 2003). For the purpose of this study, HRQOL referred to the impact of UF symptoms on important areas of an individual's life, health, functional status, psychological, social functioning, and overall well-being.

The impact of UF symptoms on the HRQOL of women suggests this chronic condition can lead to a number of challenging social, physical, and emotional health concerns. Compared with women who have similar gynecological disorders (chronic pelvic pain, heavy bleeding, and urinary incontinence), women with UF experience a poorer HRQOL—socially, physically, and emotionally (Spies et al., 2002; Williams et al., 2006). More specifically, studies have indicated that problems related to:

1) limitations in social life,
2) anxiety related to inability to predict the onset of menses,
3) loss of ability to control breakthrough bleeding, leading to embarrassment,
4) loss of control in planning for future and social activities,
5) uncertainty about treatments options being able to preserve fertility,
6) feeling a loss of control in overall health, and
7) complaints of fatigue and feelings of depression,

were identified among women with UF as factors that impact HRQOL (Borah, Nicholson, Bradley, & Stewart, 2013; Popovic et al., 2009; Spies et al., 2002; Spies et al., 2004). Women diagnosed with a debilitating health condition like UF can have many important areas of HRQOL and overall life affected.

The progression of UF symptoms is likely to increase throughout a woman's reproductive lifetime (Hartman et al., 2006). Borah et al. (2013) investigated the impact of UF on the lives of a racially-mixed group of women age 29 to 59 years in the United States. The researchers reported that 51% of the study participants, women who were age 40 to 49 years, admitted that their UF "made them feel not in control of life" (p. 319.e3) as compared to only 11% of those women aged 50 to 59 years. Vines, Ta, and Esserman (2010) suggested the presence and progression of symptomatic UF can lead to an overall decline in HRQOL and general quality of life in women by "affecting work and social activities because of pain and heavy bleeding; and leading to mental distress related to the management of the disease symptoms" (p. 5). The symptoms associated with UF can negatively influence the HRQOL of women diagnosed—socially, physically, and emotionally—when compared to those women who do not have UF (Spies et al., 2002; Williams et al., 2006). The overall physical and emotional well-being, health, social, and functional status of women with UF is impacted negatively. Furthermore, it is evident that among African American women, the negative influence of UF on their lives and health is increased because they have been shown to have a greater risk for diagnosis and experience more problems associated with UF when compared to their Caucasian and Asian counterparts. Therefore, exploring the symptoms associated with UF and the impact of UF symptoms on HRQOL (functional status, psychosocial well-being, and overall general health) is important to those African American women who have been diagnosed with this health issue.

Research on risk factors associated with UF and how they influence the health and lives of women diagnosed have received more attention within the past 5 to 10 years. However, according to Taran, Brown, and Stewart (2010), there has been limited reporting of the participants' race and ethnicity within the studies associated with UF. The researchers found among the studies published from 2000 to 2006, approximately 75% of those studies did not report the participants' race, and of those remaining studies African American women only represented 15% of the sample population. The Black Women's Health Study (BWHS), one of the largest follow- up studies exclusively among African American women ages 21 to 69 years conducted in the United States, released several UF studies (Wise et al., 2004, 2005a, 2005b; Wise, Radin, Palmer, Kumanyika, & Rosenberg, 2010). According to Taran et al. (2010), the BWHS studies were among the few that clearly identified the race of their study participants exclusively as African American. The studies from the BWHS researchers and Taran et al. (2010) suggests that clear reporting of the participants' race and ethnicity has an important role in UF research. More importantly, the need to focus UF studies specifically among women in the African American community will help the research community better understand why the racial disparity exists among African American women who have been diagnosed and treated for UF when compared to their counterparts.

This chapter provides an overall review of UF, symptoms associated with a UF diagnosis, prevalence of UF among African American women, and the impact UF symptoms have on HRQOL among African American women diagnosed with UF. In addition, the study's theoretical framework along with a summary of the study's research questions, hypotheses, and overall research approach are included. Last, this chapter provides a highlight of the study's significance and social change implication.

Background of the Problem

What Are Fibroids?

UF tumors are diagnosed in women during routine yearly physical or radiological examinations (Evans, 2008; Evans & Brunsell, 2007). The tumors described as lumps or growths develop within the wall of the uterus (Evans & Brunsell, 2007). The location of the UF tumors can vary within the uterus. Moorehead and Conrad (2001) reported that the location of UF tumors occur inside the uterine wall (*intramural*), in the abdominal cavity (*subserosal*), or in the uterine cavity (*sub mucosal*). The number of UF tumors present in one uterus can range from one single UF tumor up to as many as 20 or more, varying in size, with some being so small they are undetectable by means of a physical exam (Moorehead & Conrad, 2001; Trivedi & Abreo, 2009). UF tumors primarily form during the reproductive years of women and resolve with the onset of menopause (Evans & Brunsell, 2007). Trivedi and Abreo (2009) reported that UF are usually benign and are associated with a low mortality rate among women diagnosed in the United States. Although researchers are still actively investigating the exact cause(s) for the increased prevalence of UF diagnoses, increased symptoms, and growth rates among African American women, diet, family history, weight gain, hormonal and estrogen levels are some of the preliminary factors that have been associated (Evans & Brunsell, 2007; Huyck et al., 2008; Schwartz et al., 2000; Wise et al., 2005a).

Fibroids and Age

UFs are reported to be common among women of reproductive age in the United States. The findings of several research studies reveal that the UFs and the symptoms associated with UF impact more women during their reproductive years (Baird, Dunson, Hill, Cousins, & Schectman, 2003; Davis et al., 2009; Wise et al., 2005b). Studies performed by both Davis et al. (2009) and Wise et al. (2005) revealed that African American women between the ages of 25 and 45 years have a statistically significant ($p > 0.001$) greater risk of diagnosis of UF when compared to Caucasian women. More specifically, in a study completed by the National Institute of Environmental Health Sciences, it was reported that by the age of 50 years, more than 80% of African American women and about 70% of Caucasian women in the United States would be affected by UF (Baird et al., 2003). Researchers have found that African American women have a three-fold increased age-adjusted incidence rate and relative risk of fibroid tumor diagnosis when compared to women from Caucasian, Hispanic, and Asian backgrounds (Baird et al., 2003; Eltoukhi, Modi, Weston, Armstrong, & Stewart, 2013; Marshall et al., 1997). The average age of diagnosis among African American women with UFs when compared to their Caucasian counterparts was 5.3 years younger; African American women usually received a diagnosis on average at 40.8 years of age versus a diagnosis at 45.1 years of age for Caucasian women (Huyck et al., 2008). Researchers have found that African American women are diagnosed and treated for symptoms associated with UF more often throughout their reproductive lifetime when compared to their counterparts from other racial backgrounds (Hartman et al., 2006; NIH, 2011; Wise et al., 2005a, 2005b). The increased number of UF diagnoses among African American women of reproductive age compared to the diagnosis of UF among their racial counterparts suggests this chronic condition has become a public health concern (Eltoukhi et al., 2013).

Prevalence and Uterine Fibroids

Prevalence rates of UF vary and are difficult to narrow depending upon the population examined (U.S. Department of Health and Human Services [U.S. DHHS], 2011). Feinberg, Larsen, Catherino, Zhang, and Armstrong (2006) found that UF were three times more prevalent among African American women (30.8%) when compared to Caucasian women (10.7%) in their study. In the United States, prevalence rates for UF are estimated primarily based on the annual rate of hysterectomies and myomectomies performed. Researchers Flynn et al. (2006) reported that African American women are more likely to require surgical treatment (myomectomy and hysterectomy) for treatment of UF when compared to Caucasian women. Mauskopf et al. (2005) reported that, of the 600,000 hysterectomies performed in the United States on an annual basis, 33% to 40% are related to treatment for UF among women diagnosed. In addition, reportedly at least 34,000 myomectomies are performed annually to remove UF among women diagnosed in the United States (U.S. DHHS, 2011).

Several studies have listed UF as the principal single indicator for hysterectomies among women (Flynn et al., 2006; Hartmann et al., 2006; U.S. DHHS, 2011). Keshavarz, Hillis, Kieke, and Marchbanks (2002) investigated the trends of hysterectomies performed on women in the United States from 1994 to 1999. Their findings demonstrated a 17% increase in the rate of hysterectomies performed related to the diagnosis of UF among women. More specifically, Keshavarz et al. (2002) found the rate of hysterectomies for African American women with UF between the ages of 40–44 years was 16.8 per 1,000 women compared to a rate of 10.8 per 1,000 women for Caucasian women in the same age group. According to Myers et al. (2002), the cumulative risk of a hysterectomy due to UF for all women between the ages of 25–45 years is 7%. However, for African American women with UF in that same age category, the risk of hysterectomy can be as high as 20% (Myers et al., 2002).

The healthcare cost associated with treatment of UF can be substantial for those women who are diagnosed with this condition. The Agency for Healthcare Research and Quality in their Fibroid Registry report noted that in the year 2000 alone, it was estimated that, “253,000 hospital admissions (surgical and nonsurgical) with a principal diagnosis of uterine fibroids” (U.S. DHHS, 2011, para. 3) resulted in hospital charges of more than $2.6 billion (Flynn et al., 2006). Hartmann et al. (2006) found in their study that direct costs (out of pocket expenses associated with in- patient hospitalizations, ER visits, out-patient procedures, and drug cost) and the indirect cost (work absenteeism and disability claims) combined were at least 2.6 times higher for women with UF than for women without UF. These researchers suggested that increased medical expenses are likely to be incurred by African American women who are apt to experience more severe UF symptoms when compared to Caucasian women. UF can have a negative financial impact on African American women because of the frequency with which surgical interventions are performed due to a UF diagnosis (Mauskopf et al., 2005; U.S. DHHS, 2011) along with the increased use of health care resources for treatment of UF (Flynn et al., 2006; Hartmann et al., 2006). Although there is a low mortality rate among African American women diagnosed with UF (Trivedi & Abreo, 2009), the health distresses and financial and physical burdens of treatment that UF can have on the HRQOL of African American women is far more relevant. There is a gap in the literature exploring the severity of UF symptoms and the impact of UF symptoms on the HRQOL of African American women age 30 to 45 years.

Theoretical Framework

A revised version of Wilson and Cleary's 1995 model of HRQOL (Ferrans, Zerwic, Wilbur, & Larson, 2005) guided this study (see Figure 1).

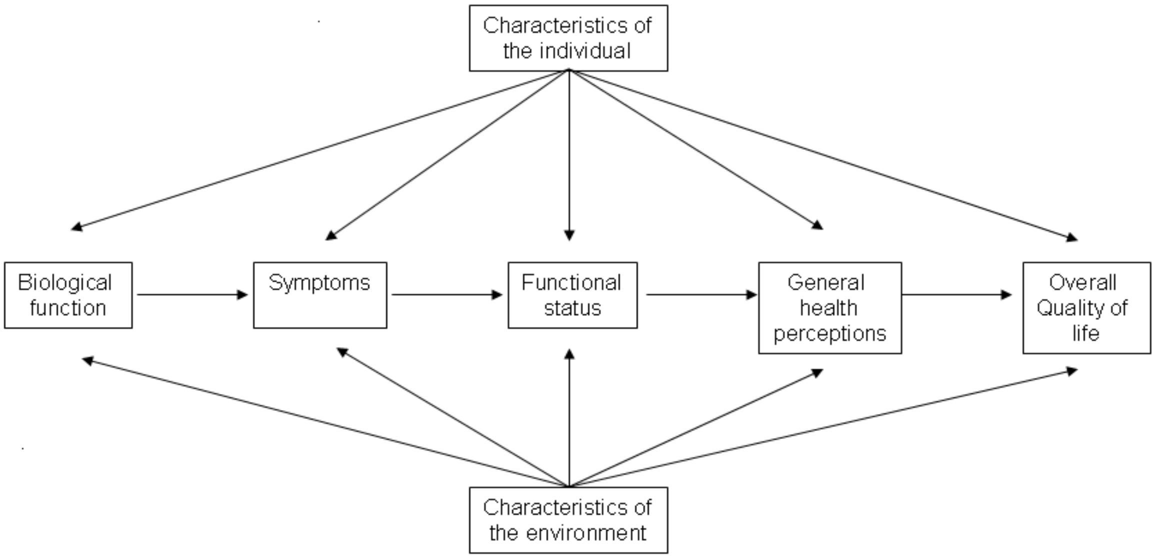

Figure 1. Revised Wilson and Cleary's model of health-related quality of life.

From "Conceptual model of health-related quality of life" by C. Ferrans, J. Zerwic, J. Wilbur, & J. Larson, 2005, *Journal of Nursing Scholarship,* 37(4), p,338. Reprinted with permission.

The Wilson and Cleary model was designed in part to help delineate the difference between the terms quality of life and HRQOL while drawing the focal point of research to address the effects of health, illness, and treatment on the overall individual (Ferrans et al., 2005). However, Ferrans et al. (2005) noted that the initial model still had some ambiguity associated with the HRQOL model determinants, and additional clarification was needed. They suggested that researchers and practitioners needed a causal model that would “clearly indicate the elements of HRQOL and their determinants” (Ferrans et al., 2005, p. 336). The researchers revised the initial model to add more clarification to the elements of HRQOL and clearly delineate how all of the determinants of the model are influenced by characteristics of the individual and the environment. The revised Wilson and Cleary model of HRQOL (Ferrans et al., 2005) expands the original model to include other domains of life experiences, their influences on health, and viewing the individual as a whole including the biological, psychological, and social aspects of being. Subsequently, the researchers suggested in the revised model that all areas in life affect health, and it is important to recognize how all of these factors influence HRQOL (Ferrans et al., 2005).

Biological function as the first determinant of the model includes the physiological processes that support life (Ferrans et al., 2005). According to Wilson and Cleary (1995), biological function is a fundamental determinant of health status and the model. The focal point of biological function is to examine the performance of cells and organ systems and can often be measured through lab tests, physical assessment, and medical diagnosis (Ferrans et al., 2005). The researchers believed that changes in an individual’s biological function could influence all the subsequent determinants of the model, including symptoms, functional status, general health perceptions, and overall quality of life.

Symptoms, the next model determinant, is described as “a patient’s perception of an abnormal physical, emotional, or cognitive state, which can be categorized as physical, psychological, or psychophysical" (Ferrans et al., 2005, p. 339). According to Ferrans et al. (2005), at least three common dimensions of symptoms are generally measured in testing instruments: frequency, intensity, and distress. Although these are not the only common dimensions that can be used to measure symptoms, it is important that instruments used for investigating symptoms allow participants to rate or identify their personal experiences with symptoms associated with their disease process. Symptoms are an important feature to address when investigating HRQOL as they are unique to the individual and may differ in persons who are experiencing the same disease process.

The next level of the revised Wilson and Cleary model is functional status, which assesses the ability of an individual to perform tasks in several areas: physical, social, and psychological (Ferrans et al., 2005; Wilson & Cleary, 1995). The need to measure functional status as a separate variable is pertinent because researchers have indicated that multiple elements of functionality can be assessed with this component (Ferrans et al., 2005; Wilson & Cleary, 1995). Specifically, Ferrans et al. (2005) stated that exploration of functional status helps to assess and explore how the capacity to perform day-to-day activities, physical activity, and specific tasks has been impacted. More importantly, the researchers identified functional status as the focus of how individuals maximize the abilities and functions that remain and not necessarily the loss of function.

General health perceptions follow functional status as the next level of the model. At least two characteristics are important to recognize when reviewing general health perceptions:

1) They synthesize all of the components that come before it in the model.
2) They are subjective in nature. (Ferrans et al., 2005; Wilson & Cleary, 1995)

General health perceptions are a separate component of the model that consists of more than just combining the preceding concepts (Ferrans et al., 2005). Ferrans et al. suggested this component is highly personal, and additional variables such as physiological processes should be included when investigating this concept. According to Ferrans et al., people commonly contemplate several aspects of their health, lives, and the relevance of each when considering their general health. Although general health perceptions are described as being complex and individualized in nature, they are most often simply measured on a Likert-type scale from *poor* to *excellent* using one single global question (Ferrans et al., 2005).

All of the previous components of the model ultimately influence overall quality of life, the last model component (Ferrans et al., 2005). Overall quality of life is individualized and subjective, based on how happy or satisfied individuals may be with their life in total (Ferrans et al., 2005; Wilson & Cleary, 1995). Overall quality of life is based on the individuals' perception of their own life satisfaction. This component can be complex and multidimensional. According to Ferrans et al. (2005), overall quality of life or life satisfaction may be dependent upon several factors including perception of personal attributes (e.g., personal characteristics, demographic characteristics, optimism, or pessimism) and their internal standards (e.g., personal values, expectation levels, and personal needs). It is important to note that overall quality of life can be measured using one single global question asking individuals to indicate how satisfied they are with life in general measured on a Likert-type scale from *poorly satisfied* to *highly satisfied* or with several questions that investigate satisfaction level in multiple aspects of a person's life (Ferrans et al., 2005)

According to Ferrans et al. (2012), characteristics of the individual and characteristics of the environment were included in Wilson and Cleary's original model but required more delineation and clarity. As a result, characteristics of the individual and environment were clearly defined and conceptualized to help provide more clarity as to how they influence the five components of the model (Bakas et al., 2012). Characteristics of the individual in the revised model are described as those biological, demographic, developmental, and psychological factors that influence health outcomes (Ferrans et al., 2005). Biological factors are those characteristics (e.g., skin color, family history of genetically linked disease, and body mass index) that may increase or decrease an individual's potential for developing a health condition or medical problem (Ferrans et al., 2005). Demographic characteristics of the individual include gender, age, and ethnicity and are generally nonmodifiable. Developmental characteristics of the individual take into account the level at which a person is able to comprehend, institute, change, or modify a behavior (Ferrans et al., 2005). The researchers indicated that although this variable is not static, it also "cannot be changed or altered by interventions" (Ferrans et al., 2005, p. 337). However, it is important to consider developmental characteristics when deciding which types of health interventions will be successful with certain populations of individuals (e.g., children versus adults; Ferrans et al., 2005). Psychological factors, according to Ferrans et al. (2005), are dynamic, responsive to intervention, modifiable, and include cognitive processes that change individual perceptions, such as motivation and beliefs.

Characteristics of the environment are either physical or social factors that influence health outcomes (Ferrans et al., 2005). Ferrans et al. described physical characteristics of the environment as the unique aspects of various communal settings that may influence health outcomes, such as an individual's home, neighborhood, and workplace. Social characteristics of the environment are defined as the influence of significant others, such as marriage partners, friends, and cultural heritage on health behavior and health practices (Ferrans et al., 2005).

The revised Wilson and Cleary model has been used to explore HRQOL among an array of racial and ethnic populations with varied health conditions, such as heart failure, HIV, and breast cancer (Henderson, Martino, Kitamura, Kim, & Erlen, 2012; Heo, Moser, Riegel, Hall, & Christman, 2005; Sammarco & Konecny, 2010). For the purposes of this study, the revised Wilson and Cleary model of HRQOL (Ferrans et al., 2005) was used as a guide to obtain empirical evidence from an existing population of African American women ages 30–45 years diagnosed with UF. The following determinants of the revised Wilson and Cleary model of HRQOL were the focus of this research: characteristics of the individual and environment, biological function, symptoms, functional status, general health perception, and overall quality of life (see Table 1; more details provided in Chapter 2). More specifically, I used the revised model to focus the investigation on the following variables: age, family history of UF diagnosis, employment, body mass index (BMI), symptom severity, concern, activities, energy/mood, control, self-consciousness, sexual function, health perception, life satisfaction (see Table 1), and HRQOL. These variables were examined among African American women age 30 to 45 years with a diagnosis of UF.

Table 1

Model Components and Related Study Variables

Model Components	**Related Study Variables**
Characteristics of the Individual	Self -reported age in years
Characteristics of the Environment	Family history of UF diagnosis Employment
Biological Function	Body Mass Index
Symptoms	Symptom Severity
Functional Status	Concern, Activities, Energy/Mood, Control, Self- Consciousness, and Sexual function.
General Health Perception	How would you rate your current health on a scale of 1 to 10 (with 1= poor and 10 = excellent)?
Overall Quality of Life	How satisfied are you with your overall life in general on a scale of 1 to 10 (with 1 = poorly satisfied and 10 = very satisfied)

Although African American women aged 30 to 45 years diagnosed with UF may be aware of some of the health, social, and physical barriers that occur with symptomatic UF, they may have had limited opportunity to identify and articulate how UF symptoms are affecting their HRQOL. I utilized participants' demographic information along with the Uterine Fibroid Symptom and Health Related Quality of Life (UFS-QOL) instrument to explore UF symptom severity and the impact of UF symptoms on HRQOL among African American women age 30 to 45 years who were diagnosed with UF.

Problem Statement

The negative impact UF symptoms can have on HRQOL, along with the increased propensity for UF development among African American women, and the burden of increased usage on healthcare systems for treatment of UF make this chronic and progressive health condition a growing public health concern (NIH, 2011; ORWH, 2006). Data on HRQOL associated with UF show that women with UF have significantly lower HRQOL scores when compared to those women without this condition (Pron et al., 2003; Spies et al., 2002). Researchers have indicated that women diagnosed with UF are not only impacted by their experience with the physical symptoms associated with UF, but they also expressed feelings of hopelessness, emotional distress, concerns related to body image, problems with sexual function, and relationships (Borah et al., 2013). The progressive and chronic impact UF can have on HRQOL has lead several researchers to suggest that further research in this area is needed (Cambridge & Sealy, 2012; Harding, Coyne, Thompson, & Spies, 2008; Hartman et al., 2008; Lerner et al., 2008). Harding et al. (2008) implied that more research that focuses on patient-reported outcomes about the problems and issues associated with UF symptoms is important for the development of patient-centered care options and to potentially improve patient outcomes. Williams et al. (2006) also suggested that continued research that offers details and descriptions of the specific areas in health and daily lives of women that are most affected by UF is necessary. Exploring the impact of UF symptom severity on the HRQOL of African American women provided a unique opportunity to gain a better understanding of the personal impact of UF symptoms on overall health and HRQOL and support informed decision making among African American women whose lives may be impacted adversely by symptomatic UF.

African American women have a higher number of UF diagnoses that result in increased need for surgical treatments (i.e., hysterectomy and myomectomy) because of the symptoms associated with UF compared to Caucasian women (Davis et al., 2009; NIH, 2011). More importantly, researchers have also suggested that the presence of symptomatic UF can lead to an overall decline in job performance and impact African American women negatively both socially and emotionally (Lerner et al., 2008; Vines, Ta, & Esserman, 2010). Researchers associated with the BWHS have published studies that have addressed risk factors associated with UF diagnosis (Wise et al., 2004, 2005a) and environmental factors that may impact UF among African American women (Wise et al., 2005b, 2010). Other researchers have investigated and compared risk factors, environmental factors, or social factors associated with UF among African American women and Caucasian women (Davis et al., 2009; Hartman et al., 2006; Lerner et al., 2008; Mauskopf et al., 2005; Smith, Upton, Shuster, Klein, & Schwartz, 2004; Vines, Ta, & Esserman, 2010). Borah et al. (2013) have investigated the impact of UF on the quality of life among a racially diverse group of women age 29 to 59 years. Spies et al. (2002)

and Spies et al. (2004) have investigated UF symptoms and factors that affect HRQOL among white and black women in their studies. However, none have explored UF symptom severity and the impact of UF symptoms on HRQOL among African American women age 30 to 45 years. There is a gap in the literature regarding symptom severity associated with UF and the impact of UF symptoms on HRQOL among African American women aged 30 to 45 years.

Purpose of the Study

The purpose of this study was to explore the severity of symptoms associated with UF and the impact of UF symptoms on HRQOL of African American women ages 30 to 45 diagnosed with UF. The study was designed to aid in determining the relationship of specific factors that influence HRQOL among women who have been diagnosed with UF. It was also designed to offer these women's personalized perspective on how their lives are being impacted by UF symptoms in order to assist investigators in their continued efforts to monitor HRQOL and the impact of issues that influence HRQOL.

In this study, the revised Wilson and Cleary model of HRQOL was utilized as the foundation to investigate the following factors: BMI, symptoms, functional status, overall quality of life, general health perception, characteristics of the individual, and characteristics of the environment among African American women age 30 to 45 years with a diagnosis of UF. The revised Wilson and Cleary model of HRQOL was used in this study to explore HRQOL among African American women who are diagnosed with UF. More specifically the determinants of the revised Wilson and Cleary model, was utilized to investigate seven distinct UF condition categories: symptom severity, concern, activities, energy/mood, control, self-conscious, and sexual function, based on the UFS-QOL instrument.

Research Questions and Hypotheses

The following research questions and hypotheses were developed and were used in order to explore the severity of UF symptoms and the impact of UF symptoms on HRQOL.

The specific goal of the first six research questions was to examine the association between symptom severity and the six HRQOL subscale variables (concern, activities, energy/mood, control, self- consciousness, sexual function), as measured by the UFS-QOL.

Research Question 1: What is the association between symptom severity, as measured by the UFS-QOL instrument, and concern (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?

H_{01}: There will not be an association between symptom severity, as measured by the UFS-QOL instrument, and concern (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF.

H_{A1}: There will be an association between symptom severity, as measured by the UFS- QOL instrument, and concern (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF.

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptom severity and concern.

Dependent variable: Concern (summed score of questions 9, 15, 22, 28, 32 on the survey).

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey)

Research Question 2: What is the association between symptom severity, as measured by the UFS-QOL instrument, and activities (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?

H_{02}: There will not be an association between symptom severity, as measured by the UFS-QOL instrument, and activities (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF.

H_{A2}: There will be an association between symptom severity, as measured by the UFS- QOL instrument, and activities (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptom severity and activities.

Dependent variable: Activities (summed score of questions 10, 11, 13, 19, 20, 27, 29 on the survey).

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey).

Research Question 3: What is the association between symptom severity, as measured by the UFS-QOL instrument, and energy/mood (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

H_{03}: There will not be an association between symptom severity, as measured by the UFS-QOL instrument, and energy/mood (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF.

H_{A3}: There will be an association between symptom severity, as measured by the UFS- QOL instrument, and activities (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptom severity and energy/mood.

Dependent variable: Energy/mood (summed score of questions 12, 17, 23, 24, 25, 31, 35 on the survey).

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey).

Research Question 4: What is the association between symptom severity, as measured by the UFS-QOL instrument, and control (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

H_{04}: There will not be an association between symptom severity, as measured by the UFS-QOL instrument, and control (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF.

H_{A4}: There will be an association between symptom severity, as measured by the UFS- QOL instrument, and control (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptom severity and control.

Dependent variable: Control (summed score of questions 14, 16, 26, 30, 34 on the survey).

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey)

Research Question 5: What is the association between symptom severity, as measured by the UFS-QOL instrument, and self-consciousness (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

H_{05}: There will not be an association between symptom severity, as measured by the UFS-QOL instrument, and self-consciousness (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF.

H_{A5}: There will be an association between symptom severity, as measured by the UFS- QOL instrument, and self-consciousness (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptom severity and self-consciousness.

Dependent variable: Self- Consciousness (summed score of questions 18, 21, 33 on the survey).

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey).

Research Question 6: What is the association between symptom severity, as measured by the UFS-QOL instrument, and sexual function (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

H_{06}: There will not be an association between symptom severity, as measured by the UFS-QOL instrument, and sexual function (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF.

H_{A6}: There will be an association between symptom severity, as measured by the UFS- QOL instrument, and sexual function (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptom severity and sexual function.

Dependent variable: Sexual Function (summed score of questions 36 and 37 on the survey).

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey).

A. The specific goal of Research Question 7 was to examine the associations between symptom severity, body mass index (BMI), and overall HRQOL. The specific goals of Research Questions 8 and 9 were to examine the associations between symptom severity, body mass index (BMI), and overall HRQOL, controlling for three covariables (age, family hx of UF, and employment).

Research Question 7: What is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women ages 30 to 45 years diagnosed with UF?

H_{07}: There will not be an association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF.

H$_{A7}$: There will be an association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: HRQOL score (sum of 6 subscale scores range 29 to 145)

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey) and BMI =Overall calculated value based on participants height and weight (participant's response to two questions on the DI form: question #2- What is your height? and question #3-What is your weight?)

Research Question 8: When controlling for characteristics of the individual (age) what is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF?

H$_{08}$: When controlling for characteristics of the individual (age) there will not be an association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF.

H$_{A8}$: When controlling for characteristics of the individual(age) there will be an association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: HRQOL score (sum of 6 subscale scores range 29 to 145)

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey) and BMI =Overall calculated value based on participants height and weight

(participant's response to two questions on the DI form: question #2- What is your height? and question #3-What is your weight?)

Covariant Characteristics of the Individual: Age (participant's response to one question about age #1 on the DI form).

Research Question 9: When controlling for characteristics of the environment (family hx of UF diagnosis and employment) what is the association between symptom severity as measured by the UFS- QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF?

H_{09}: When controlling for characteristics of the environment (family hx of UF diagnosis and employment) there will not be an association between symptom severity as measured by the UFS-QOL instrument, BMI and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF.

H_{A9}: When controlling for characteristics of the environment (family hx of UF diagnosis and employment) there will be an association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: HRQOL score (sum of 6 subscale scores range 29 to 145)

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey) and BMI =Overall calculated value based on participants height and weight

(participant's response to two questions on the DI form: question #2- What is your height? and question #3-What is your weight?)

Covariants Characteristics of the Environment:

- Family History of UF diagnosis (participant's response to one family history of UF diagnosis question #5 on the DI form)
- Employment (participant's response to question # 4 on the DI form: Yes, No, I do not know).

Data analysis (Research Questions 7, 8, 9): Hierarchical multiple regression analysis will be used determine if there is a relationship between symptom severity, BMI, and HRQOL, when controlling for three co- variables (age, family hx of UF, and employment). The variables will be added to the model in three steps. In step one, the control variables characteristics of the individual (age), and characteristics of the environment (family history of UF diagnosis, and employment) and the dependent variable HRQOL score will be added to the model. In step two, the variable symptom severity and the dependent variable HRQOL score will be added to the model. In step three, the variable BMI will be added to the model, and the dependent variable HRQOL score.

B. The specific goal of Research Question 10, was to examine the association between symptoms severity, HRQOL total score, and general health perception. The specific goals for Research Questions 11 and 12 was to examine the association between symptom severity, HRQOL total score, and general health perception, controlling for three co- variables (age, family history of uterine fibroids and employment history).

Research Question 10: What is the association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF?

H_{010}: There will not be an association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF.

H_{A10}: There will be an association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: General health perception (participants response to one global question #7 on the DI form- “How would you rate your current health on a scale from 1 to 10 (with 1= poor and 10 = excellent)?”).

Independent variable: HRQOL score (sum of 6 subscale scores range 29 to 145) and Symptom Severity (summed score of questions 1-8 on the survey).

Research Question 11: When controlling for characteristics of the individual (age) does symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument have an association with general health perception among African American women age 30 to 45 years diagnosed with UF?

H_{011}: When controlling for characteristics of the individual (age), symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument will not have an association with general health perception among African American women age 30 to 45 years diagnosed with UF.

H_{A11}: When controlling for characteristics of the individual (age), symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument will have an association with general health perception among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: General health perception (participants response to one global question #7 on the DI form- "How would you rate your current health on a scale from 1 to 10 (with 1= poor and 10 = excellent)?").

Independent variable: HRQOL score (sum of 6 subscale scores range 29 to 145) and Symptom Severity (summed score of questions 1-8 on the survey).

Covariant Characteristics of the Individual: Age (participant's response to one question about age #1 on the DI form)

Research Question 12: When controlling for characteristics of the environment (family hx of UF diagnosis and employment) does symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument have an association with general health perception among African American women age 30 to 45 years diagnosed with UF?

H_{012}: When controlling for characteristics of the environment (family hx of UF diagnosis and employment), symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument will not have an association with general health perception among African American women age 30 to 45 years diagnosed with UF.

Sub H_{A12}: When controlling for characteristics of the environment (family hx of UF diagnosis and employment), symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument will have an association with general health perception among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: General health perception (participants response to one global question #7 on the DI form- “How would you rate your current health on a scale from 1 to 10 (with 1= poor and 10 = excellent)?”).

Independent variable: HRQOL score (sum of 6 subscale scores range 29 to 145) and Symptom Severity (summed score of questions 1-8 on the survey).

Covariants Characteristics of the Environment:

- Family History of UF diagnosis (participant’s response to one family history of UF diagnosis question #5 on the DI form)
- Employment (participant’s response to question # 4 on the DI form: Yes, No, I do not know)

Data analysis (Research Questions 10, 11, 12): Hierarchical multiple regression analysis will be used to determine if there is a relationship between symptom severity, HRQOL and general health perception controlling for three co variables (age, family hx of UF, and employment). The variables will be added to the model in three steps. In step one, the control variables characteristics of the individual (age), and characteristics of the environment (family history of UF diagnosis, and employment) and the dependent variable general health perception will be added to the model. In step two, the variable symptom severity and the dependent variable general health perception will be added to the model. In step three, the variable HRQOL will be added to the model, and the dependent variable general health perception.

The specific goal of Research Question 13 was to examine the association between symptom severity and overall quality of life.

Research Question 13: What is the association between symptom severity as measured by the UFS-QOL instrument and overall quality of life among African American women age 30 to 45 years diagnosed with UF?

H_{013}: There will not be an association between symptom severity as measured by the UFS-QOL instrument and overall quality of life among African American women age 30 to 45 years diagnosed with UF.

H_{A13}: There will be an association between symptom severity as measured by the UFS-QOL instrument and perception of overall quality of life among African American women age 30 to 45 years diagnosed with UF.

Data analysis: Linear regression analysis will be used to determine if there is a relationship between symptoms severity and overall quality of life among African American women age 30 to 45 years diagnosed with UF.

Dependent variable: Overall quality of life (response to one global question #8 on the DI form- ‘How satisfied are you with your overall life in general on a scale from 1 to 10 (with 1 = poorly satisfied and 10 = very satisfied)?”)

Independent variable: Symptom Severity (summed score of questions 1-8 on the survey).

Nature of the Study

In this study, the severity and impact of UF symptoms on HRQOL of African American women age 30 and 45 years diagnosed with UF was explored. The exploratory, nonexperimental, quantitative research method was chosen for this study. This method was suitable for this study because none of the independent variables (symptom severity, BMI, HRQOL, age, and family history of UF diagnosis) were able to be ethically manipulated.

The aim of the study was to investigate the perspective of African American women's experiences with UF symptoms and their impact on HRQOL utilizing the Wilson and Cleary revised model of HRQOL. I investigated seven UF condition- specific categories: symptom severity, concern, activities, energy/mood, control, self-consciousness, and sexual function, based on the UFS-QOL survey. A more detailed presentation of the methodological process for this study is presented in Chapter 3.

The sampling frame for this study included African American women who are affiliated with two graduate chapters of Delta Sigma Theta Sorority, Inc.—Marietta-Roswell Alumnae (MRACDST) located in Cobb County and Stone Mountain Lithonia Alumnae (SMLACDST) located in DeKalb County. Additionally, women who are affiliated with Run Girl Run (RGR), a running group for African American women in Atlanta, received an invitation to participate in the study. The combined membership of SMLACDST, MRACDST, and RGR totals approximately 1,600 women. Based on a G*Power analysis of Faul, Erdfelder, Buchner, and Lang (2009), an anticipated sample size of 92 study participants was required. The invitation for participation was sent to the organizations' leadership teams via e-mail to distribute to the members and affiliates of their organizations. African American women who have a current diagnosis of UF, are between the ages of 30 and 45 years, have never received treatment in the form of a myomectomy, hysterectomy ,or uterine artery embolization, and are members or affiliates of the identified organizations were asked to participate in the study.

Operational Definitions of Terms

The following terms are defined as they are used in this study.

African American women: Any women of African heritage (African American, descendants of Africans); throughout this research the terms African American and Blacks are interchangeable and mutually inclusive.

Hysterectomy: Invasive surgical procedure that removes the uterus leaving women with the inability to get pregnant/conceive (Evans & Brunsell, 2007).

Myomectomy: Invasive surgical procedure to remove/excise uterine fibroids tumors from the uterus that leaves the uterus intact for conception (Evans & Brunsell, 2007).

Uterine artery embolization: Procedure designed to cut the blood supply to UF tumors, causing them to shrink (Wolanske & Gordon, 2004).

Assumptions, Limitations, and Delimitations

Two assumptions provided the basis for this research. In this study, it was assumed that HRQOL exists as a multidimensional construct, and that abstract and unobservable constructs, such as symptom severity and health perception among African American women age 30 to 45 years with a diagnosis of UF, can be quantified and tested by the UFS-QOL survey instrument. In this study, it was also assumed that African

American women age 30 to 45 years with a diagnosis of UF will accurately and honestly answer questions that measure the concepts of interest in this study.

The inclusion of only African American women between the ages of 30 and 45 years limits the findings from being generalized to the entire African American female population, or to other racial or ethnic groups. Another limitation of the study is that biological function as a study construct was self-reported by study participants as I had no access to participants' personal medical healthcare records. The revised theoretical model characteristics of the individual are comprised of four focus areas: psychological, development, biological, and demographic. Biological characteristics of the individual such as diet (D'Aloisio, Baird, DeRoo, & Sandler, 2010; Radan, Palmer, Rosenberg, Kumanyika, & Wise, 2010; Villarosa, 2003), obesity (Flake, Anderson, & Dixon, 2006; Parazzi et al., 2004; Trivedi & Abreo, 2009), and estrogen level (Dixon et al., 2006; Flake et al., 2006) are reported to have an association with UF. However, access to participants' medical records was unavailable to me as the researcher and was required in order to ascertain information related to a diagnosis associated with these biological characteristics of the individual. In addition, inquiries into the participants' dietary habits were outside of the focus area of the study and the study survey instrument. Developmental characteristics of the individual focus on the individuals' intellectual capacity to change or modify behavior, while psychological characteristics of the individual center on the different types of motivation for starting and maintaining certain behaviors (Ferrans et al., 2005). To date, no developmental studies investigating an individual's intellectual capacity for behavior change related to UF have been published, and psychological factors associated with the need for and ability to sustain behavior change related to UF was outside the scope of this research. Therefore, as a study delimitation, characteristics of the invidual only included the following biological and demographic factors: family history of UF, sex, age, and race. Also the developmental factors of the characteritics of the indvidual (participants intellectual capacity to participate in the study) was delimited to and addressed as a part of the eligibility criteria for participation in this study (see Chapter 3).

An additional limitation of the study was that questionnaires that are self-reporting present difficulties in accuracy of response and recall. Participants may also experience some level of discomfort with providing information about medical history in the questionnaires. The last limitation of this study was that the researcher used a convenience sample in which participants were recruited because they were accessible to the researcher based on their affiliation with RGR, MRACDST, and SMLACDST.

UFs affect many women, but there is a higher prevalence among African American women of child- bearing age compared with women of other races (Davis et al., 2009; Wise et al., 2005b). A delimitation of this study was that the participants were only African American women who had a current diagnosis of UF, and age 30 to 45 years. Another delimitation of this study was to focus on women who had not received medical treatment in the form of a hysterectomy, myomectomy, or UFE for the alleviation of UF tumors or the symptoms associated with UF. The aforementioned study delimitation was important to note because the questions on the UFS-QOL instrument are UF-condition specific and based upon participants having the presence of UFs at the time of completion of the survey (Coyne et al., 2012).

Significance of Study

The symptoms associated with UF can be debilitating for women. Women who have been diagnosed with UF face a myriad of issues related to how to effectively address the UF symptoms, minimize financial burden, and limit interruption in their lifestyle. According to Davis et al. (2009), African American women diagnosed with UF typically have more than one UF tumor, a variety of symptoms, and more prominent health problems related to the diagnosis. As the role of African American women continues to evolve in the work force, community, and in the home, the troubles of lengthy recovery times and extended leaves from work associated with the symptoms or medical treatment of UF no longer appear to be a functionally or financially conducive option. The ability of African American women to continue leading active and meaningful lives while addressing the problems associated with UF and UF symptoms depends on the impact of this chronic condition to their HRQOL. In this study, data obtained from participants' demographic history along with the UFS-QOL instrument were used to explore UF symptom severity and the impact of UF symptoms on HRQOL among African American women age 30 to 45 years who are diagnosed with UF. The following variables based on the revised Wilson and Cleary model of HRQOL were used to guide this research: age, family history of UF diagnosis, employment, BMI, symptom severity, concern, control, activities, self-consciousness, sexual function, energy/mood, general health perception, and overall quality of life, with more details provided in Chapter 3.

Social Change

Research suggests problematic UF has had a negative impact on various areas of HRQOL and lead to increased distress on health and life of African American women who are diagnosed with this condition (Cabness, 2010; Cambridge & Sealy, 2012; Lerner et al., 2008; Popovic et al., 2009; Spies et al., 2002). Specifically, researchers have found a number of UF symptoms have been associated with poorer job performance, high levels of stress, increased need for surgical intervention, and limited social interaction among African American women diagnosed with UF (Lerner et al., 2008; Mauskopf et al., 2005; Smith et al., 2004; Spies et al., 2002, 2004; Vines, Ta, & Esserman, 2010). The social change implication of exploring personal health factors associated with UF and their specific impact on HRQOL is key in supporting health care providers in the development of health maintenance programs that can aid African American women with implementing improved symptom management and potentially enhancing HRQOL. The availability of information related to UF symptoms and impact of UF symptoms on HRQOL may help decrease adverse outcomes associated with UF and positively support the continued well-being of African American women diagnosed.

Summary

UFs are a medical condition with widespread symptoms that occur among women of all races. The Office of Research on Women’s Health (2006) indicated that 20–25% of all women in the United States of reproductive age have symptomatic UF. However, African American women are likely to be diagnosed up to three times more when compared to their Euro American, Asian, and Hispanic counterparts (Moorehead & Conrad, 2001; NIH, 2011). Researchers have identified that UF symptoms and the problems associated with UF symptoms can affect the HRQOL among women diagnosed. The impact of UF symptoms on the HRQOL of African American women ages 30 to 45 years diagnosed with UF requires further attention. This study investigated the experiences among African American women diagnosed with UF ages 30 to 45 years regarding symptom severity associated with UF and impact of UF symptoms on HRQOL. This study explored these variables using the revised Wilson and Cleary model of HRQOL as a theoretical guide.

Chapter 1 offered an overview of UF and its impact on the HRQOL of women. Chapter 1 also provided the basis for the importance of the research with an overview of current research. Literature relevant to the purpose of the research is presented in Chapter 2. In Chapter 3, I discuss the selected methodology in this study, including sampling procedures, research procedures, and sample characteristics. Details on the reliability and validity of the instruments used in the study are also discussed in Chapter 3. In Chapter 4, the results of the research study and the analysis used in this study are outlined. In Chapter 5, I will communicate the summary, possible implications, conclusion and recommendation(s) for further research.

Chapter 2: Review of Literature

Introduction

This chapter includes a review and analysis of relevant literature that pertain to African American women and UF. The methodologies implemented in previous research studies and those utilized in this dissertation are also reviewed. The review begins with correlates that have been associated with UF risk factors and HRQOL, UF treatment, and financial implications, then moves to the revised Wilson and Cleary model of HRQOL that guided the study, and narrows with measures that have been used to investigate HRQOL among women with UF. The social change construct and its relevance to the impact of UF on HRQOL among African American women are also reviewed. Because the prevalence of UF is high among African American women and their HRQOL is being impacted, further investigation into the burden and impact of UF symptoms is warranted. The following literature review will support these variables as well as summarize previous and current research findings. This chapter will also identify topic areas that require further investigation and review in future research.

I identified information for use in this literature review by searching for peer-reviewed journal articles, scholarly books, electronic dissertations, and published manuscripts dated from 1988–2015. I sought to identify only relevant studies and sources for this research project, regardless of date. The seminal literature sources utilized for this research project relate to information specific to the participating sorority-community service organization (Giddings, 1988), the theoretical framework (Ferrans & Powers, 1992; Leidy, 1994; Lerner & Levine, 1994; Wilson & Cleary, 1995), and UF (Kjerulff, Lagenberg, & Sieden, 1996; Marshall et al., 1997), as these factors are central variables in this research project. The primary search engines utilized were EBSCO databases of Academic Search Premier, CINAHL PLUS, MEDLINE, SociIndex, PsychINFO, and PsycArticles. An array of key search terms (*African American, Black, women, uterine fibroids, uterine leiomyomata, health related quality of life, quality of life, symptoms, hysterectomy, myomectomy, hospital, treatment, risk factors, impact of uterine fibroids*) were used to narrow and focus the search for relevant research literature.

Women, Uterine Fibroid Risk Factors, Symptoms, and Health-Related Quality of Life

The etiological factors associated with a diagnosis of UF continue to be investigated. It has been difficult for researchers to narrow the cause to any one specific factor. Researchers have identified the following as having an increased risk for diagnosis of UF: dietary practices (D' Aloisio, Baird, DeRoo, & Sandler, 2010; Radan, et al., 2010; Villarosa, 2003), hormone and estrogen levels (Dixon et al., 2006; Flake, Anderson, & Dixon, 2006), and obesity or weight gain (Faerstein, Szklo, & Rosenshein, 2001; Parazzi et al., 2004; Trivedi & Abreo, 2009; Wise et al., 2005a). Approximately 60% of African Americans reportedly do not engage in the recommended amount of exercise (Centers for Disease Control and Prevention [CDC], 2007). Many African Americans report dietary practices that are high in fat and lacking in fruit, vegetables, and whole grains (Felton, Boyd, Bartoces, & Tavakoli, 2002). It is important to note that obesity, weight gain, and dietary practices have consistently been noted as risk factors among African American women with a diagnosis of UF.

Modifiable Uterine Fibroid Risk Factors

Diet. Dietary practices may influence the risks associated with a diagnosis of UF (D’ Aloisio et al., 2010; Radin et al., 2010; Trivedo & Abreo, 2009). Radin et al. (2010) found that foods that raise an individual’s blood glucose concentration have been associated with an overall risk of development of UF among younger women. Trivedi and Abreo (2009) also reported that women who had vegetarian or primarily fish-eating diets were three times less likely to have UF when measured against women who were primarily red-meat eaters. The study findings of D’ Aloisio et al. (2010) suggest that soy based food products may increase the risk of fibroid development among women due to the high concentrations of estrogenic isoflavones. In a study of dietary practices of Black women, Wise et al. (2010) reported that eating foods high in fat content and lower in dairy products were inversely associated with UF risk among Black women who were symptomatic.

Estrogen/hormones. The exact role and influence of hormonal and estrogen levels in the development of UF continues to be explored. However, some researchers have found that hormonal and estrogen levels in women have an influence on the development of UF tumors (Evans, 2008; Radin et al., 2010; Wise et al., 2005a). According to Flake et al. (2003), dietary practices can also have an impact on the stimulation of estrogen metabolism in premenopausal women. The researchers indicated that diets that are high in fiber and low in fat may be a contributing factor in reducing serum estrogen. Baird et al. (2006) found that Black women who exercised at least 4 hours per week had lower circulating sex hormones (estrogen), and insulin levels were found to have a slower onset of UF development. It is important to note that the problems associated with UF development tend to decline with the onset of menopause in Black and White women suggesting that the growth of UF tumors are sensitive to the sex hormones estrogen and progesterone (Stewart, 2001).

Obesity or weight gain. Not only has obesity been shown to have an association with increased risk for diagnosis of UF, but weight gain has also been reported to have an association. Flake et al. (2003) reported an association between an elevated BMI or obesity and the presence of UF particularly among women in the United States. According to Van Voorhis (2009), weight gain among African American women was associated with the existence of UF. In a retrospective study conducted by Trivedi and Abreo (2009), 2,540 cases of UF diagnosis over a 14-year period among women ages 23–51 years were reviewed for pre-disposing factors associated with UF occurrence among women. The researchers found an 18% increase in the incidence rate of UF occurrence for every 10-kg rise in weight among women in their study population. The researchers suggest that an association exists between UF diagnosis and higher BMI. According to Wise et al. (2005a), weight gain had a positive risk association with UF among parous African American women only in the Black Women's Health Study. The researchers also found premenopausal African American women with a BMI between 20.0–22.4 demonstrated an association with increased risk of UF when compared to those with a BMI less than 20.0.

Nonmodifiable Uterine Fibroid Risk Factors

Age. Studies demonstrate that African American women are more likely to develop UF at an earlier age, have more than one UF tumor, have UF tumors that are larger, and experience more severe symptoms compared to women of other races (Evans & Brunsell, 2007; Flake et al., 2003; Huyck et al., 2008; Kjerulff, Lagenberg, & Sieden, 1996). Study findings by Peddada et al. (2008) indicated the rate at which UF tumors grow are similar for both African American and Caucasian women under the age 35; however, as women get older, the growth rate declines for Caucasian women, but increases for African American women. Davis et al. (2009) conducted a 4-year study between 2001 and 2004 investigating UF growth, symptoms, and clinical outcomes among African American and Caucasian women ranging in age from 20 to 54 years. The researchers found that African American women in the following age categories had the highest percentage of UF diagnosis: 30–34 years, 29%; 35–39 years, 22%; and 40–44 years, 29%. In addition, they found that 80% of African American women versus 69% of Caucasian women in the study population with UF were between the ages of 30 and 44 years. The Black Women’s Health Study (Wise et al., 2005b) also reported a peak age of diagnosis for UF among African American women to be 40 to 45 years.

Race. Davis et al. (2009) also found that 90% of the women in their study, both African American and Caucasian, reported having more than one UF tumor and approximately 33% had more than 10 UF tumors. However, the researchers also found, despite the increased number of UF tumors reported by both African American and Caucasian women, the African American women in their study population still had a statistically significant (*p* = 0.004) higher number of diagnoses of UF in comparison to the Caucasian women (Davis et al., 2009). Research indicates African American women are at greater risk for development of UF when compared to Caucasian and Asian women (Davis et al., 2009; Moorehead & Conrad, 2001; ORWH, 2006). Hyuck et al. (2008) found that the Black participants in their study population reported increased symptoms of menstrual pain and fewer days between menstrual cycles when compared to the White participants.

Family history. Studies specifically examining the relationship between family history of UF and UF development are limited; however, some researchers have found a correlation between the two factors. Schwartz et al. (2000) found that participants in their study population who had a mother or sister with a diagnosis of UF were 33.2% more likely to have UF when compared to the control group who did not have relatives with UF. Peddada et al. (2008) reported study findings that women in their study population with an identical twin sister were observed to have a risk for earlier onset of UF development when compared to women who did not have an identical twin. Studies among African American women with UF have also found that family history of UF has some correlation to UF development and symptom severity. Hyuck et al. (2008) reported African American women with a family history of UF diagnosis expressed increased severity of UF symptoms when compared to Caucasian women.

Uterine Fibroids Symptoms and Health Related Quality of Life

The symptoms associated with UF can lead to negative health consequences for diagnosed women. In addition, UF tumors cause an array of burdensome health problems which can negatively impact HRQOL including excessive menstrual bleeding, painful cramping, frequent urination, lower back pain, spot bleeding in between periods, and painful sexual intercourse (Evans, 2008; Fennessy, Kong, Tampany, & Swan, 2011; Villarosa, 2003). Exploration into the views of African American women diagnosed with UF on how UF symptoms are impacting their health and HRQOL was conducted by Cabness (2010) who found that 60% of the women in her study admitted that symptoms associated with UF was a factor involved in their thought process prior to selection of medical intervention. The researcher suggested that the perception of symptom severity caused by UF among African American women with UF plays a fundamental role in determining the type of medical treatment they will select.

Some of the more problematic physical symptoms associated with the presence of UF have led to miscarriages and even resulted in the loss of the uterus for some women (Moorehead & Conrad, 2001; Williams et al., 2006). The aforementioned is of significant import because a diagnosis of UF can make the ability to have children difficult if not impossible and potentially cause a negative effect on HRQOL for some women in their reproductive years. The NIH (2011) indicated that African American women were less successful in positive reproductive treatment outcomes and more likely to have UF when compared to their Caucasian counterparts among the category of women who were pursuing treatment for reproductive health problems. Researchers have demonstrated that UF can negatively affect the reproductive health of African American women (Moorehead & Conrad, 2001; NIH, 2011; Williams et al., 2006) and that there is a need to further understand the unique experiences that occur among African American women diagnosed with UF who are of reproductive age.

Symptoms. The symptoms associated with UF can have a direct bearing on the functional ability, emotional state, work performance outcomes, and self-perception of health in women diagnosed (Cote, Jacobs, & Cumming, 2003; Downes et al., 2010; Lerner et al., 2008; Spies et al., 2002). Lerner et al. (2008) found among women with UF, reports of more difficulty managing physical and interpersonal job tasks, increased at-work productivity loss, increased fatigue, and difficulty concentrating were consistently higher among African American women compared to Caucasian women in their study population. Using data from a multicenter clinical trial in Ontario, researchers Pron et al. (2003) found of the 85% of the women with UF who were working in their study population, almost half had work absences related to symptoms associated with uterine fibroids. Downes et al. (2010) conducted an analysis of 1,756 women in five European (France, Germany, Italy, Spain, and United Kingdom) countries diagnosed with or experiencing UF related symptoms. Their study findings demonstrated a loss in work productivity by 36% and a 37.9% decrease was noted in the general activity level for women with UF compared to women without UF in their study population.

Problems with bloating, pain, feeling of fullness and heaviness in the abdomen, bleeding that may interfere with sexual function and cause uncontrolled soaking of clothing, bleeding that inhibits some social and physical activities are common among women with UF (Spies et al., 2004). Moreover, researchers have demonstrated that some of the aforementioned problems interfere with and limit the important roles women are able to play in their family, community, and workplace (Cambridge & Seally, 2012; Lerner et al., 2008; Spies et al., 2004). Researchers indicated UF are the most common benign tumors in women of child bearing age, and many women commonly experience physical problems with abnormal and excessive bleeding, urinary and bowel problems, and severe pelvic pain, along with other impediments such as limited physical and social activity, and fatigue (Kjerulff et al., 1996; Walker & Stewart, 2005). Spies et al. (2002) also reviewed several reoccurring themes among women related to UF symptoms. The authors found that physical symptoms such as pelvic pressure, back and pelvic pain, fatigue, and break through bleeding often were identified as problematic issues among women with UF. Multiple researchers have found increased fatigue, depressive symptoms, difficulty concentrating, and feelings of anxiety are commonly reported concerns among African American women with UF (Cabness, 2010; Lerner et al., 2008; Popovic et al., 2009). Symptoms such as breakthrough and untimely bleeding, pelvic pain, cramping, and frequent urination have been identified as a concern among African American women with UF and supported by research as having a negative impact on HRQOL.

Health related quality of life. When reviewing UF and symptoms associated with UF development, the varied ways in which HRQOL is affected is important. Evans (2008) found that many women strive to understand “safer and more natural approaches” (p. 31) to UF development and symptom prevention, in order to minimize the impact of UF on HRQOL. Fennessy et al. (2011) suggested that HRQOL factors such as motivation for later childbearing and shorter recovery time may be reasons why women are increasingly seeking “minimally invasive” (p. 786) treatment options for UF. Side effects associated with UF (bleeding, pain, and bulkiness) along with women’s desire to avoid surgical interventions that may negate their ability to remain childbearing are some of the factors identified by Evans (2008). Indeed, concerns related to invasive treatment options, reproductive health outcomes, and symptom management, among others, can shape perceptions of how HRQOL is being affected by UF and support reasons why African American women desire to become more knowledgeable about UF influencing factors.

Vines, Ta, and Esserman (2010) reported that African American women with elevated levels of stress had a modest association with the presence of UF when compared with Caucasian women in their study population. Feelings of increased anxiety related to insecurity and shame of breakthrough bleeding prevented African American women with UF from attending social events were reported in one study (Cabness, 2010). More specifically, Lerner et al. (2008) found feelings of depression (fatigue and difficulty concentrating) were consistently higher among African American women with UF compared to African American women without UF among their study population. The emotional burden of high stress levels and increased anxiety found to be associated with the presence of symptomatic UF among African American women can potentially have a negative influence their HRQOL.

Zimmerman et al. (2012) found among women with UF in their study population, that work performance, sexual function, family, and relationships, were some of the important life dynamics that were negatively impacted by problems associated with UF. Spies et al. (2002) found other life dynamics such as concern over inability to control bleeding, concern or fear of soiling clothes, and decreased level of energy to participate in activities were frequently identified as quality of life issues among women. The researchers also found that of the six HRQOL variables (concern, activities, energy/mood, control, self-conscious, sexual function) associated with UF, Black and White women identified, concern (soiling cloth, soiling bed linens, inability to predict onset of periods), and control (ability to participate in social activities, productivity, overall health) as two of the highest problem areas.

Aiding African American women's understanding of the problems associated with UF symptoms can influence decisions related to health treatment options and symptom management. Ankem (2007) investigated the information seeking behavior among 28 women aged 20 to 58 years diagnosed with symptomatic UF. The demographic breakdown of the study population was 81.6 % African American, 12.3% Caucasian, and the remaining 6.1% were of other ethnicity or racial backgrounds. The researcher noted among the women in his study population, "almost all expressed a great need for information on diagnosis, treatment and self-care" (Ankem, 2007, p. 167) related to UF. Their research findings demonstrate that African American women are seeking to gain more insight into options for care and treatment of symptomatic UF.

African American women with UF are interested in preserving their ability to remain child bearing. Research suggests that African American women with UF are actively seeking out information related to UF symptoms and ways they can minimize those symptoms from impacting their lives (Ankem, 2007). Therefore, more investigation that focuses specifically on patient-reported problems and issues associated with UF symptoms may support health professionals and African American women alike in gaining more insight into some of the problems faced by women diagnosed with this condition. Studies conducted that have investigated the impact of UF on HRQOL of women with UF (Davis et al., 2009; Lerner et al., 2008; Popovic et al., 2009; Spies et al., 2004) have compared pre and post UF treatment symptom severity and manifestation of UF symptoms only as the measure of HRQOL. To date none has explored the impact of UF symptoms on the HRQOL of African American women aged 30 to 45 years.

Uterine Fibroid Treatment and Financial Implications

The increased number of UF diagnoses and expanded utilization of health care resources for treatment of UF suggests this chronic condition is becoming an increased health concern. Problematic UF symptoms often lead African American women to seek the advice of health care practitioners and potentially pursue medical intervention. The myomectomy, Uterine artery embolization (UAE) or hysterectomy, are the most common medical procedures used to treat UF. Evans and Brunsell (2007) reported findings indicating 30% of the hysterectomies performed are associated with the “presence of uterine fibroid tumors” (p. 1506). Myers et al. (2002) found the cumulative risk of a hysterectomy due to uterine fibroids for all women between the ages of 25-45 years is 7%. However, for African American women in that same age group with UF the risk goes up to as high as 20%.

Uterine Fibroid Treatments

Hysterectomy is a treatment method used to impede women from having a reoccurrence of UF growth by removing the uterus. However, because the uterus is removed during this procedure women are then prevented from being able to conceive children. Increased health concerns related to the symptoms (bleeding, reproductive difficulties, pain) associated with UF and the increased number of UF tumors cause African American women to be more likely to receive hysterectomies compared to Caucasian women (Faerstein et al., 2001; Viswanathan et al., 2007). Myers et al. (2002) reported the rate at which hysterectomies are required due to health problems associated with UF is up to 20% among African American women compared to 7% among Caucasian women. The Agency for Healthcare Research and Quality sponsored a study conducted by Viswanathan et al. (2007) which found that 50% of African American women, compared with 30% of Caucasian women were likely to require hysterectomies because of complications related to UF. Researchers have found the number and size of UF tumors are increased among African American women who receive hysterectomies compared to Caucasian women (Kjerulff, Lagenberg, & Sieden, 1996; Moorman, Leppert, Myers, & Wang, 2013). Subsequently, it is likely that African American women who are treated surgically for UF are at increased risk for post-surgical complications such as infections and bleeding (Eltoukhi et al., 2013). It is important to note that in spite of some of the potential complications associated with the hysterectomy procedure, there are additional surgical procedures available to women who want to treat UF that can preserve their ability to conceive.

The myomectomy procedure is just as surgically invasive as the hysterectomy. The most significant difference between the hysterectomy and myomectomy procedures is that the latter removes the UF tumors and leaves the uterus intact for women who may want the option of getting pregnant (Evans & Brunsell, 2007; Van Voorhis, 2009). Although the UF tumors are surgically removed with the myomectomy procedure, there is a strong possibility that the UF tumors can return (Van Voorhis, 2009). While the myomectomy supports the ability of women to conceive children, the surgical procedure is associated with increased medical cost and greater risk of morbidity (U.S. DHSS, 2011). Myers et al. (2002) reported that approximately 37,000 myomectomies are performed on an annual basis in the United States. This number remains comparable to more recent statistics, which indicate that as of 2011 at least 34,000 are performed annually in the United States. (U.S. DHSS, 2011). Reducing the burden of treatment and providing women with UF the options that support improved health is imperative towards positively impacting HRQOL.

In recent years, research has focused on alternative treatments for UF that are not as costly as the hysterectomy or myomectomy procedure. The procedure known as the UAE reportedly offers similar relief in symptoms and supports improved HRQOL. UAE is the latest method of treatment used to address UF and the symptoms that are associated with diagnosis. It was not until the late 1980s that UAE demonstrated a positive response in causing UF to shrink and in its effectiveness for controlling the symptoms associated with the presence of UF in women (Wolanske & Gordon, 2004). The UAE procedure is different from the hysterectomy and the myomectomy in that it does not require being operated on under general anesthesia. In this procedure, the blood supply to UF is cut off, which causes them to shrink (Beard, 2006; Miller, 2005). Although UAE has been demonstrated to be an effective option for UF treatment that allows women to keep their uterus intact and offer shorter recovery times, it is unclear if women will be able to successfully conceive and carry a fetus to term after having the procedure (Van Voorhis, 2009).

The emotional and physical burden experienced by women diagnosed with UF who have to seek out medical interventions, further suggest that the presence and treatment of UF can cause disruption in health and quality of life. According to Dixon et al. (2006), more research in the area that focuses on improved symptom management and enhanced quality of life is necessary in order to help support continued efforts in the development of less invasive treatment strategies and to decrease the negative effect of UF on African American women’s reproductive health. Subsequently, in order to assist African American women in better understanding how to best approach UF treatment, prevention, and improve HRQOL, it is important that the public health community continue to review and research the impact of UF on HRQOL for African American women with this condition.

Financial Implications

The myomectomy, UAE, and hysterectomy, are the most common medical procedures used to treat UF and the symptoms associated with UF (Kershavarz et al., 2002; NIH, 2011; Pron et al., 2003; U.S. DHHS, 2011). The high number of surgical interventions performed due to symptoms associated with UF along with the use of health care resources for treatment of UF suggests that UF have a clear financial impact on those women diagnosed. The out of pocket care expenditures associated with UF treatment are estimated to be approximately $4,624 annually for each woman (Hartmann et al., 2006); this suggests that an economic burden exists for women with UF in the United States. The expenses related to drugs used to treat UF, managing the symptoms associated with UF (bleeding and pelvic pain), and work loss due to UF symptoms present an undue financial burden for these women (Cote, Jacobs, & Cumming, 2002; Mauskopf et al., 2005). According to the ORWH (2006), the medical costs associated with treatment and management of symptoms of UF are unduly borne by African American women due to their increased likelihood to be diagnosed with UF.

Theoretical Model

There are a number of HRQOL models that have been used to investigate the interrelationship of concepts related to illness, health, communities, and individuals. However, over the past 10 years, three have emerged as the most commonly used models of HRQOL that offer a clear, more concise, and less ambiguous framework to guide research specific to HRQOL (Bakas et al., 2012). The three HRQOL models identified by researchers Bakas et al. (2012) are the Wilson and Cleary model of HRQOL, the World Health Organization International Classification of Functioning Disability and Health (WHO ICF), and the Revised Wilson and Cleary model of HRQOL. All three models were found to be useful in exploring the causal and reciprocal relationship between multiple variables to allow researchers and practitioners to “make sense of real world application” (Bakas et al., 2012, p. 4), and brought structure to HRQOL research. However, researchers noted that there are some limitations to the WHO-ICF model. The WHO-ICF model is restricted in its ability to discriminate between conditions that are non-health related, is more applicable for classification and mapping of disease processes, and is not unique to HRQOL research (Bakas et al., 2012; World Health Organization [WHO], 2007). The symptoms associated with UF have the potential to affect the physical health, functional ability, and emotional health of the women diagnosed. Therefore, it is important to have a model that will encompass and explain multiple aspects of how UF symptoms can impact HRQOL.

Original Wilson and Cleary Model of HRQOL

The original model developed by Wilson and Cleary is rooted in a disease-based framework or model of health-related quality of life (Wilson & Cleary, 1995) to allow researchers and healthcare providers the ability to focus on the social, psychological, and physical impact of disease on the total being. By integrating two different views of health, the biomedical and the social science, Wilson and Cleary (1995) were able to focus on understanding relationships between fundamental components of life and health, exploring the overall well-being, and functioning of individuals. As a result, the authors proposed that the model would focus on five main determinants: biological function, symptoms, functional status, general health perceptions and overall quality of life (Wilson & Cleary, 1995).

In this model, connecting associations between five patient outcome measurements (biological function, symptoms, functional status, general health perceptions and quality of life) were identified. It is important to note that three of the limitations of the original model were that it lacked clarity in identifying causal relationships between the model determinants, it was ambiguous in defining the critical elements of HRQOL and it contained numerous arrows that were marked with examples

(Ferrans et al., 2005). Researchers indicated it was difficult to manage and clearly identify relationships between the components of the model because of the examples indicated on the arrows (Ferrans et al., 2005).

The Revised Wilson and Cleary Model of HRQOL

The revised Wilson and Cleary model of HRQOL takes into consideration not only the original five patient dimensions (biological function, symptoms, functional status, general health perceptions, and overall quality of life), but also the impact of characteristics of the individual and environment on these dimensions (Ferrans et al., 2005). In order to help clarify the impact and streamline the causal relationship between all of the model determinants, one of the key changes made in the revised model was to address the labels and arrows within the original model. For instance, in the revised model, example labels on the arrows were omitted to help streamline causal associations between components (Ferrans et. al, 2005). In addition, directional arrows from characteristics of the individual and characteristics of the environment were included to demonstrate that biological function is influenced by these two elements (Ferrans et al., 2005). Furthermore, the researchers of the revised model highlighted that the arrows in the revised model indicate the "dominant causal associations" (Ferrans et al., 2005, p. 338) between the model components and the path of the arrows can demonstrate reciprocal relationships in the model, but they are not necessarily demonstrated in the figure.

One of the premises for the revised Wilson and Clearly model of HRQOL is that different people with the same condition may experience that condition in different ways based upon their perception of the condition and outside influencing factors. This concept is important because an array of health problems and personal concerns have been identified among women diagnosed with UF. Some of these issues include increased healthcare costs (Cote, Jacobs, & Cummings, 2003; Hartman et al., 2006), functional limitations and decreased work performance (Downes et al., 2010; Lerner et al., 2008), and constant feelings of fatigue, depression and anxiety (Brolmann & Hurine, 2008; Popovic et al., 2009; Spies et al., 2002). Subsequently, in order to gain greater clarity and understanding of some of the factors that influence the HRQOL of women who have been diagnosed with UF, it is important to further investigate this condition utilizing the revised Wilson and Cleary model of HRQOL. The constructs of the revised Wilson and Cleary model of HRQOL will be useful in this study because their use will provide a broader approach to explore HRQOL among African American women who are diagnosed with UF. More specifically, the revised model will be used as the foundation to investigate BMI, symptom severity, functional status, quality of life, general health perceptions, characteristics of the individual (age), and characteristics of the environment (family hx of UF diagnosis and employment) among African American women age 30 to 45 years with a diagnosis of UF.

Model Constructs

Characteristics of the individual. According to Ferrans et al. (2005), characteristics of the individual are identified as factors that influence health outcomes. These factors are categorized as demographic, biological, psychological, and developmental (Ferrans et al., 2005). While the demographic, biological and developmental characteristics of the individual are usually not modifiable, they do provide researchers with relevant information to help determine how and which populations should be targeted for health interventions.

Demographic factors such as age and race have been linked to increased diagnoses of UF among African American women (Davis et al., 2009; NIH, 2011; Wise et al., 2005b). In addition, biological factors such as family history of UF does play a role in risk for UF diagnosis (Evans & Brunsell, 2007; Schwartz et al., 2000) and increased symptomology (Hyuck et al., 2008) among African American women. Therefore, the association between age and family history of UF diagnosis will be included as characteristics of the individual and will serve as the focus of this research.

Developmental characteristics of the individual take into account the level at which a person is able to comprehend, institute, change or modify a behavior (Ferrans et al., 2005). This variable is not static and is non-modifiable but must be considered when considering what population can and should be targeted for interventions designed to change or modify behavior (Ferrans et al., 2005). Studies investigating an individual's intellectual capacity for behavior change based on UF symptoms that are unrelated to medical treatment have yet to be published. While the focus of this study is not to seek to change or modify participants' behavior, participants' intellectual capacity and ability to articulate how their lives are affected by UF is important. Therefore, developmental characteristics of the individual for participants in this study will be addressed utilizing the study eligibility criteria by requiring participants to be able to read and understand English on at least a 12th grade level. Research specifically related to psychological characteristics of the individual on the ability of individuals to sustain behavior change related to UF symptoms is unavailable. It is important to note that the ability to sustain behavior change related to UF symptoms and HRQOL is outside the scope of this research; therefore, psychological characteristics of the individual will not be included as a variable in this study.

Characteristics of the environment. Characteristics of the environment are either social or physical (Ferrans et al., 2005). According to Ferrans et al. (2005), individuals' cultural heritage plays an important role in how they are affected by their social environment. Research suggests that social factors such as a culture of "suffering in silence" (Cambridge & Sealy, 2012, p. 21), is widespread among African American women diagnosed with UF. Research has identified that "suffering in silence" (Cambridge & Sealy, 2012, p. 21) is also common practice among women who experience significant problems with UF. Giving voice to women diagnosed with UF is important in helping to raise public awareness about some of the health problems associated with UF and support the need for further research related to the exact cause of this condition among women, particularly African American women.

The influence of significant others, such as marriage partners, family, friends and other social support systems are also included but not limited to the social characteristics of the environment (Ferrans et al., 2005). Published research relevant to the potential relationship or association between social characteristics of the environment such as participants' marital status, family and friend support systems, and other social support networks and UF is unavailable and outside the scope of this research. Therefore, the influence of marital status, friends and other social support systems will be excluded as a variable in this study.

Research indicates that physical factors of the environment such as work and job performance can influence HRQOL (Ferrans et al., 2005). Studies have shown that decreased work productivity and work loss are pertinent concerns identified by women diagnosed with UF and are supported by research as having a negative impact on HRQOL (Downes et al., 2010; Lerner et al., 2008; Pron et al., 2003). Cote, Jacobs, and Cummings (2002) estimated that costs associated with work loss from symptoms associated with UF are around $1,692 annually per woman. Identifying some of the unique experiences that occur among women diagnosed with UF particularly African American women will help focus attention on the specific concerns of African American women who are challenged physically, socially, and emotionally by this chronic condition. Therefore, the impact of UF on employment or the need to take time off work will be included as the characteristic of the environment variable in this study.

Biological function. Biological function is one of the determinants of health status and includes the physiological processes that support life (Ferrans et al., 2005; Wilson & Cleary, 1995). Biological functions focus on the performance of cells, organ systems, and are often measured utilizing lab tests, physical assessments, and medical diagnoses (Ferrans et al., 2005; Wilson & Cleary, 1995). Furthermore, alterations in biological function can affect all other factors of quality of life such as symptoms, functional status and general health perceptions (Ferrans et al., 2005; Wilson & Cleary, 1995). For example, researchers have found that, among African American women, estrogen level and elevated BMI may increase their risk for developing UF (Faerstein, Szklo, & Rosenshein, 2001; Flake, Andersen, & Dixon, 2003). Feelings of anxiety, depression, and problems with fatigue are some common physical factors identified among African American women with UF. Multiple researchers have found increased fatigue, depressive symptoms, difficulty concentrating, and feelings of anxiety are commonly reported concerns among African American women with UF (Cabness, 2010; Lerner et al., 2008; Popovic et al., 2009). For the purpose of this study, biological function will focus on participants BMI. The BMI will be calculated using the CDC Adult BMI Calculator tool (CDC, 2013). The participants will self- report their individual height and weight using the demographic survey form. Participants' self- reported height and weight will then be loaded into the Adult BMI Calculator tool (CDC, 2013) and their corresponding BMI range (underweight, normal, overweight, and obese) will be obtained. Estrogen levels as a biological function will be excluded as I will not have access to participant's medical records in order to ascertain this information.

Symptoms. According to Figure 1, biological function moves to symptoms, the second major determinant of the revised model. According to Wilson and Cleary (1995), a symptom may encompass the individual's perception of any abnormal physical, emotional or psychological conditions. Progressive conditions such as symptomatic UF generally result in symptoms such as excessive and unpredictable menstrual bleeding, pain, abdominal bloating, and frequent urination, which can be distressful for women (Evans, 2008; Fennessy et al., 2011; Villarosa, 2003). Zimmerman, Bernuit, Gerlinger, Schaefers, and Geppert (2012) reported complaints of pain symptoms, heavy bleeding, sexual-dysfunction, negative impact on relationships, and work performance were common among the women with UF who participated in their international study. UF symptoms are often individualized and can manifest differently in each individual. According to Ferrans et al. (2005), it is important to understand the relationship between the physical and emotional symptoms an individual may experience in order to recognize how they affect health related quality of life. UF symptom severity will be investigated as the symptom component of the theoretical model for this study. Exploring how African American women diagnosed with UF evaluate and interpret the severity of UF symptoms and the relationship between those UF symptoms and HRQOL, is essential in gaining a better understanding of some of the barriers that impede positive HRQOL.

Functional status. The third factor of the revised Wilson and Cleary model is functional status in which the ability of an individual to perform certain tasks is assessed (Ferrans et al., 2005). This multidimensional concept characterizes an individual's ability to perform activities of daily living, fulfilling usual roles, and maintain health and well-being (Bennett, Steward, Kayser-Jones, & Glasser, 2002; Leidy, 1994). Four domains of functioning that are often measured are physical, social, role, and psychological (Wilson & Cleary, 1995). Ferrans et al. (2005) in their revised model focused on the effects of a health condition on functional status and its impact on daily life. Some of the functional limitations expressed by women with UF include but are not limited to: difficulty concentrating, depressive symptoms, decreased work performance, and impaired sexual function (Cabness, 2010; Lerner et al., 2008; Popovic et al., 2009; Zimmerman et al., 2012). Multiple researchers have found several functional areas of daily life that have been impacted among women who are diagnosed with UF. Subsequently, for the purpose of this study functional status will be investigated in six areas that are often impacted in the lives of women with UF based on the UFS-QOL survey instrument (Spies et al., 2002): concern, activities, energy/mood, control, self-consciousness, and sexual function.

General health perceptions. General health perceptions are described as the individuals' overall evaluation of the various aspects of their health, in addition to others that may not be depicted by the model (Wilson & Cleary, 1995), and is the next level of the revised Wilson and Cleary model. General health perceptions are subjective in nature and allow for the individual to:

1) summarize all of the aforementioned concepts
2) place value on the importance of each variable
3) generate a summation of individual health.

Ferrans et al. (2005), suggests that general health perceptions can be measured with one global rating of health, indicating an overall health rating on a Likert-type scale of poor to excellent. Cambridge and Sealy (2012) stated, "…while UF are not as life threatening as HIV and cancer, they do affect one's well-being…" (p. 28). In this study, I will utilize one global question based on Ferrans et al. (2005). This question will ask participants to rate their current health on a scale of 1 to 10 to examine general health perceptions. It is important to evaluate how African American women diagnosed with UF characterize and view their overall health.

Overall quality of life. All of the aforementioned components of the revised Wilson and Cleary model (Ferrans et al., 2005) have an effect on the last component, overall quality of life as a dimension of the total HRQOL model. According to Ferrans et al. (2005), overall quality of life is rooted in a person's sense of well-being that stems from satisfaction or dissatisfaction with the areas of life that are important to him or her. Indeed, African American women with symptomatic UF are often challenged with constant pain, embarrassment, and in some cases limited support systems (Cambridge & Sealy, 2012) which can negatively affect their life and sense of well-being. It is important to note that the preceding components of the model allow overall quality of life to be subjective for each person and allows for individualized perception of illness impact. Various researchers have described how UF symptoms have affected the quality of lives for women diagnosed in a number of ways. Popovic et al. (2009) reported issues such as limitations in social life, loss of control, fatigue, and depression were identified concerns among the women with UF in their study population. In addition, other concerns such as increased risk for infertility, fatigue, depression, and decreased urinary function because of UF development and the symptoms associated with UF have been reported among women diagnosed with UF (Brolmann & Hurine, 2008; Moorehead & Conrad, 2001; Parazzini et al., 2004; Popovic et al., 2009). Due to the subjective and individualized reports of acuity associated with UF symptoms among women diagnosed it is important to understand how their personal views of the impact of UF symptoms is shaped by various physical, psychological and social attributes of the disease process as suggested by Ferrans et al. (2005). Based on Ferrans et al., (2005), I will include one question asking participants to rate how satisfied they are with their overall life to serve as the overall quality of life measure for this study.

Theoretical Model and Other Research Studies

Researchers Heo et al. (2005) used the revised Wilson and Cleary model to investigate the impact of heart failure diagnosis on HRQOL among their study participants. The purpose of their study was to measure the ability of the revised Wilson and Cleary model of HRQOL to identify variables that influence HRQOL among patients with a heart failure diagnosis. It is important to note that the specific racial makeup of its sample population was not identified, but does specify that the sample population was only elderly women. The researchers found the revised Wilson and Cleary model of HRQOL was useful in predicting an association with health perception and symptom status on HRQOL. However, the model was not able to demonstrate a significant association among functional status, biological/physiological and overall quality of life among participants in their sample population (Heo et al., 2005). Based on the findings of the researchers' some correlation between general health perception and symptoms was noted using the revised Wilson and Cleary model; however, the model was limited in being able to adequately delineate all of the HRQOL factors associated with persons who have complex heart conditions.

The revised Wilson and Cleary model of HRQOL was used by Saban et al. (2007) to investigate patients' perspectives and experiences of factors that impacted HRQOL among individuals who were undergoing elective lumbar spinal surgery. Their study population was composed of participants between 21 and 84 years with a mean age of 53.4 years. Over half of their study population (52.6 %) was female and 89.5% were White, 8.9% were Black with the remaining percentage classified as American Indian.

The study findings demonstrated that the revised Wilson and Cleary model of HRQOL was useful in investigating the specific HRQOL factors associated with persons undergoing this surgical procedure. The model identified that fatigue, as a biological determinant along with other variables remained an issue for the subjects postoperatively. Conversely, symptom status, functional status and overall general mood were reportedly improved post operatively among the study participants. According to the researchers, two of the major limitations to the study were the small sample size and the lack of a control comparison group (Saban et al., 2007). This suggests that the revised Wilson and Cleary model of HRQOL may be an appropriate model to capture the individuals' perspectives on how their health and life is affected by a progressive medical condition like UF prior to treatment.

Research suggests that individuals with a positive HIV diagnosis are living longer and are likely to experience more co- morbid complications such as liver disease because of the antiretroviral medications taken to treat some of the symptoms associated with the HIV infection (Henderson et al., 2012). Utilizing the revised Wilson and Cleary model of HRQOL to investigate if persons living with HIV and liver disease had a poorer HRQOL compared to persons living with only HIV was the focus of the study by Henderson et al. (2012). For the comparison and control groups in the study, men represented 67.5 % and 72.7% respectively of the study population. In addition, it is important to note that anywhere from 45% to a little over 50% of the study populations for both groups were classified as non-White. The study findings demonstrated that the revised model of HRQOL was able to identify race as a strong predictive co-variate linked to symptom status, functional status, and overall general health perceptions. The model also aided researchers in determining if symptom status had a direct and significant impact on the functional status and overall perception of quality of life among their study participants. This information is vital because the revised model was used successfully in determining the impact of symptoms on HRQOL of persons with a progressive and chronic condition like HIV. Subsequently, the revised model of HRQOL could possibly be used to help explore how UF symptoms are impacting the lives of women who are diagnosed with this medical condition.

Measures Used for Assessing Health Related Quality of Life and Uterine Fibroids

Historically, the availability of tools aimed at investigating women's perceptions of the severity of symptoms associated with UF and evaluating the impact on quality of life or HRQOL has been minimal. There have been at least three clinical models in recent years designed to assess HRQOL measures in women diagnosed with UF according to Williams et al. (2006). The three most prominently used instruments identified by Williams et al. (2006) are:

1) Short Form 36 (SF-36)
2) EuroQol now referred to as the EQ-5D
3) The Uterine Fibroid Symptom and Health Related Quality of Life (UFS-QOL).

According to Williams et al. (2006), the SF-36 and EQ-5D instruments/questionnaires were not developed specifically to address HRQOL perceptions in women with UF, but were found useful in being able to assess disease specific measures. Although the SF-36 and EQ-5D tools in addition to some others were adequate in reviewing symptomology associated with UF, they still lacked the capacity to explore the impact of UF and UF symptoms on HRQOL, from the patients' perspective (Spies et al., 2002).

Created by Spies et al. (2002), the UFS-QOL was designed to investigate the impact of UF on HRQOL. This clinical survey instrument was developed specifically to address questions regarding the individuals' personal experiences and feelings as they pertain to the impact of UF on HRQOL (Spies et al., 2002). The UFS-QOL is used to obtain information on the severity of UF symptoms and six subscales of HRQOL: concern, activities, energy or mood, control, self-consciousness, and sexual function (Harding et al., 2008; Spies et al., 2002). The subscales aide researchers by:

1) Providing greater insight into the specific health distresses related to UF identified by women diagnosed with the condition.
2) Reviewing the impact of identified indicators on HRQOL, and
3) Narrowing the focus on common health and personal concerns related to UF diagnosis.

The UFS-QOL questionnaire has been used in a number of studies related to UF research and HRQOL. Lerner et al. (2008) utilized the UFS-QOL instrument to evaluate women's perception of the impact of UF on their work performance. Smith, Upton, Shuster, Klein, and Schartz (2004) successfully utilized the UFS-QOL to investigate patient satisfaction on quality of life and HRQOL among women before and after the UAE procedure. Spies et al. (2002) the authors of the instrument as well as, Coyne et al.

(2012) have successfully utilized the UFS- QOL among Black and White participants and identified it as a reliable and valid instrument to measure symptoms and HRQOL in women with UF. The UFS-QOL is condition specific and designed specifically to investigate the unique experiences among women who are diagnosed with UF (Spies et al., 2002). The UFS-QOL instrument provides opportunities for the individual to articulate their feelings and experiences with UF symptoms and identify the ways UF is specifically impacting their lives. Therefore, the UFS-QOL is considered the most appropriate tool to utilize for this study when attempting to explore the impact of UF symptoms and HRQOL factors associated with uterine fibroids among African American women.

Summary

Uterine fibroid research continues to demonstrate that African American women are at a greater risk for diagnosis of UF, when compared to their Caucasian and Asian counterparts. Moreover, investigation among African American women with UF and UF symptoms impact on HRQOL is imperative. There are varying factors being investigated as the primary cause of UF development among African American women; however, research in the area of UF development and prevention has focused primarily on medical treatment. A significant portion of the research has centered on identifying the most efficacious medical treatment options for removal of UF that would decrease the extended time of recovery and still allow women of childbearing age the option to keep their uterus intact supporting improved quality of life. However, despite increased rates of UF diagnoses among African American women, there is limited research on the impact of UF symptom severity on HRQOL among African American women age 30 to 45 years utilizing the revised Wilson and Cleary model of HRQOL. Therefore, exploration into UF symptom severity and the impact of UF symptoms on HRQOL among African American women age 30 to 45 years diagnosed with UF necessitates further investigation.

In Chapter 3, I describe the methodology used in the study. The study methodology was designed to explore the impact of UF symptoms on HRQOL among African American women and identify HRQOL indicators associated with UF. The research design, sampling of the population, instrumentation, disclaimer about the protection of participants' rights, and data analysis were reviewed.

Chapter 3: Methodology

Introduction

In this chapter, the study design that was used for this study, in addition to rationale for why this study design and approach were selected, was addressed. This included general information regarding the targeted population of interest; sampling and data collection protocols; survey instrument used to retrieve data; validity and reliability. This section also included data regarding the eligibility criteria for participating in this study. Descriptions of the instrument that was used for data collection, the data collection process, and the data analysis are also included. In addition, this chapter is comprised of information related to the protection of human subjects and maintaining confidentiality within this study.

Research Design

The purpose of this study was to explore UF symptom severity and the impact of UF symptom on HRQOL among 30 to 45 years old African American women diagnosed with UF. The exploratory non- experimental quantitative research method was chosen because it provided an in- depth perspective of African American women's experiences with UF and their impact on HRQOL. The primary objective of the study was to obtain evidence from an existing population of African American women ages 30 to 45 diagnosed with UF regarding the symptoms associated with UF and the impact of UF symptoms on their HRQOL. This was an exploratory non- experimental quantitative study design utilizing a survey instrument. The type of design was selected specifically for this study due to the decreased expense and increased efficiency for expedient data collection. The survey was cross- sectional and data was collected electronically. A correlational design was used in this study. According to Polit and Beck (2008), a correlational design allows the researcher to examine interrelationships and associations among dependent variables and the independent variables that cannot be manipulated. This approach was suitable for this study because none of the independent variables (symptom severity, personal medical history, HRQOL, BMI, age, employment, and family hx of UF diagnosis) were able to be logistically or ethically manipulated. The cross- sectional design included a sample of African American women with a current diagnosis of UF, between 30 and 45 years old who were able to read and understand English. Participants of the study electronically self-administered the UFS-QOL developed by Spies et al. (2002).

Target Population

In this study, I specifically focused on 30 to 45 year old African American women who were currently diagnosed with UF and affiliated with Run Girl Run (RGR) or with the graduate chapter sorority, Delta Sigma Theta Sorority (DST), Inc. (community service organization) based in Cobb and DeKalb Counties in Georgia. The DST graduate chapters were selected because one of the foci of the national and local organization is on the physical and mental health for its members, the communities which they serve, and racial makeup of the members is primarily African American (Giddings, 1988). The emphasis on physical and mental health is a mandate from the organization on a national level and has been in place for well over 60 years (Giddings, 1988). The members of Marietta Roswell Alumnae (MRACDST) and Stone Mountain Alumnae (SMLACDST) chapters are comprised of African American women, who were residents of Cobb, North Fulton, South Fulton, and DeKalb Counties in the state of Georgia. The RGR organization was selected because one of the foci of the organization is to promote improved health and a healthy lifestyle among African American women by incorporating physical fitness into their lives (personal communication, Jones, N., July 1, 2013).

There are nine graduate DST chapters located throughout Metro Atlanta and its surrounding counties. The membership base of the local DST graduate chapters varies ranging from approximately 200 to 900 members. The approximately 530 women of the MRACDST (personal communication, Pattman, P., September 8, 2012) and approximately 854 women of the SMLACDST chapters (personal communication, Johnson, T., April 8, 2013) are African American, are early twenties and older, are a mixture of married and single women; are all college educated, and are all primarily working professionals. The combined membership of the SMLACDST and MRACDST chapters totals approximately 1,384 women, which classify the chapters as two of the larger graduate chapters of DST located throughout Metro Atlanta and its surrounding counties. Information pertaining to the demographic breakdown of the SMLACDST membership base is unavailable. However, communication with the chapter’s past president revealed that, of the approximate 854 African American women affiliated with their chapter, it is estimated that women between the ages of 30 to 45 years reportedly represent approximately 50% of the SMLACDST membership base (personal communication, Johnson, T., April 8, 2013). According to MRACDST, 73% of the chapters’ membership are between the ages of 25 and 48 years (Marietta Roswell Alumnae Chapter, Delta Sigma Theta Sorority, Inc. [MRACDST], 2011). More importantly, 60% of the members who responded to the chapter’s survey conducted in 2009-2010, noted that they had “issues with uterine fibroids” (MRACDST, 2011, para. 2) when asked to identify if they had any health concerns. RGR is an organization of approximately 200 women who are primarily of African American and between the age of 30 and 50 years (personal communication, Jones, N., July 1, 2013).

Approximately 1,600 African American women in total were accessible for this research project based on their affiliation with at least one of the three organizations. Prevalence rates for UF in the United States are estimated primarily based on the annual rate of hysterectomies and myomectomies performed (DHHS, 2011), which make it difficult to narrow the exact number of women that are currently diagnosed with UF. The ORWH (2006) indicated that 20-25% of all women in the United States of reproductive age have UF. However, the NIH (2011) reported that African American women were diagnosed with UF between three and nine times more often when compared to Caucasian women. Therefore, it was reasonable to estimate that at least 30% to 33% of all African American women or at least one in three African American women have a current diagnosis of UF. Therefore, it was justifiable to expect that at least 30% or 528 women of the 1600 women in the target population size will have a current UF diagnosis. Representatives for all three participating organizations reported approximately 50% to 70% of their membership base are between the ages of 30 and 45 years, which is the age requirement for this study. I estimated approximately 40% or 212 women of the expected target population size of 528 would be ineligible to participate in the project due to their age. Therefore, justification for an estimated target population size of 316 women (who met the age criteria of 30 to 45 years and had a current diagnosis of UF) to be eligible to participate in the study project was appropriate.

Sample Size. The primary model was examined using linear and hierarchical multiple regressions. The appropriate a priori sample size for this study was determined using G*Power analysis Faul et al. (2009). A total of 92 subjects has 80% power to detect a medium effect size f^2 equal to 0.15 with 5 predictor variables at a significance of 0.05. The effect size is estimated from the findings of Ward and Heidrich (2009) who indicated that a medium effect size was adequate to examine group differences in beliefs, coping, and perceived stigma among African American ages 25-85 years, utilizing an exploratory, cross-section survey design. The model tested whether the independent variables (UF symptom severity, BMI, HRQOL, age, and family hx of UF diagnosis) predict the dependent/criterion variables (concern, activities, energy/mood, control, self-conscious, sexual function, general health perception, and overall quality of life).

Eligibility Criteria

In order to participate in this study, the inclusion criteria were:

1) African American women aged 30 to 45 years,
2) current diagnosis of UF,
3) able to give informed consent,
4) the ability to read and understand English at a 12th grade level,
5) have access to internet and able to answer electronic survey, and

6) no surgical interventions for UF.

The exclusion criteria for this study were those African American women who were:

1) Over the age of 45 or younger than 30,
2) who have been treated for UF with the following surgical procedures (Hysterectomy, Myomectomy, and UFE),
3) who do not have a current diagnosis of UF,
4) unable to read and understand English at a 12th grade level,
5) no access to the internet and unable to answer electronic survey.

The average age of diagnosis among Black women with UF when compared to their White counterparts was 5.3 years younger, 40.8 years of age for Black women versus 45.1 years of age for White women (Huyck et al., 2008). More recently, Davis et al. (2009) reported that Black women in the following age categories had the highest percentage of UF diagnosis: 30-34 years 29%; 35-39 years 22% and 40-44 years 29% when compared to white women in their study population. Because UF tumors are generally noted to form during the reproductive years of women and resolve with the onset of menopause (Evans & Brunsell, 2007), for the purpose of this study, women ages 30 to 45 only were included.

Instruments

The Uterine Fibroid Symptom and Health Related Quality of Life (UFS-QOL) designed by Spies et al. (2002) to explore perception of symptom severity and the impact of UF symptoms on HRQOL was used for this study. Consent was obtained from Carolyn Strain, Director of the Society of Interventional Radiology (SIR) Foundation to utilize the instrument for this study (Appendix F). This clinical survey instrument was developed specifically to address questions related to the impact of UF symptoms on HRQOL matters among women diagnosed with UF (Spies et al., 2002). The UFS-QOL seeks to obtain information related to UF symptom severity and HRQOL along six subscales of categories from women who are diagnosed: concern, activities, energy/mood, control, self-consciousness, and sexual function (Harding et al., 2008; Spies et al., 2002). The 37- item survey instrument was used to assess the severity of symptoms among African American women with UF and impact UF symptoms on HRQOL. The UFS- QOL survey questionnaire is based on a 5- point Likert scale, in order to ensure consistency in the participant responses.

The survey is divided into two sections: symptom severity and HRQOL. The first eight questions of the survey are the symptom severity section of the survey. These questions use a 5- point Likert-type scale ranging from 1 (not at all) to 5 (a very great deal) for this project. The data obtained from this scale are at the ordinal level. The participants received points based upon their response as indicated: 1 point for not at all, 2 points for a little bit, 3 points for somewhat, 4 points for a great deal and 5 points for a very great deal. This section has eight questions total; therefore, scores for this section ranged from 8 to 40 (with scores closer to 40 reflecting greater perceived symptom severity) (Spies et al., 2002). According to Spies et al. (2002) the developers of the UFS-QOL instrument, section one of the survey was successful in discriminating between levels of symptom severity among women diagnosed with UF, supporting its ability and usefulness to investigate UF symptom severity from an individual perspective.

Researchers Harding et al. (2008) also found the UFS-QOL instrument was useful in investigating severity of UF symptoms among women diagnosed with UF.

Section 2 of the survey evaluates the impact of factors associated with HRQOL and consists of 27 questions. This section is broken down into six subsections: concern (Questions 9, 15, 22, 28, 32), activities (Questions 10, 11, 13, 19, 20, 27, 29), energy/mood (Questions 12, 17, 23, 24, 25, 31, 35), control (Questions 14, 16, 26, 30, 34), self-conscious (Questions, 18, 21, 33), and sexual function (Questions 36 and 37). The subscales are used to assess feelings and experiences regarding the impact of uterine fibroids symptoms on various areas of each participant's life. These questions use a 5 point Likert scale ranging from 1 (none of the time) to 5 (all of the time) for this project. The data obtained from this scale are at the ordinal level. The participants received points based upon their response as indicated: 1 point for none of the time, 2 points for a little bit of the time, 3 points for some of the time, 4 points for most of the time and 5 points for all of the time.

The HRQOL total score is the sum of the item values from each of the six subscales. The subscale for concern has a total of 5 questions; therefore scores for this section ranged from 5 to 25. The subscale for activities has a total of 7 questions; therefore scores for this section ranged from 7 to 35. The subscale for energy/mood has a total of 7 questions; therefore scores for this section ranged from 7 to 35. The subscale for control has a total of 5 questions; therefore scores for this section ranged from 5 to 25. The subscale for self-conscious has a total of 3 questions, therefore scores for this section ranged from 3 to 15. The subscale for sexual function has a total of 2 questions; therefore scores for this section ranged from 2 to 10. Therefore, the combined raw scores from each subscale represented the total score for HRQOL section and ranged from 29 to 145 (with scores closer to 145 reflecting greater impact on health related quality of life). The UFS-QOL has established reliability and validity with a subscale Cronbach's alpha range from 0.83 to 0.95 with the overall health related quality of life score alpha =0.97 and test-retest interclass reliabilities correlation coefficients of 0.76 to 0.93 (Spies et al., 2002).

The Screening information (SI) form (see appendix B) consisted of questions that were used for screening purposes for this project. The SI form had four screening questions to ensure that only women who meet the inclusion criteria were allowed to take the survey. The Demographic Information (DI) form (see appendix C), had a total of eight questions. The first six questions were used to obtain information about each participant's employment or time missed from work, height, weight, family history of diagnosis of UF, and age. The next two questions were designed to measure general health perceptions and overall quality of life. The question to measure general health perceptions was: "How would you rate your current health on a scale from 1 to 10 with 1= *poor* and 10 = *excellent*?" as suggested by Ferrans et al. (2005). The last question on the DI form, measured overall quality of life, was: "How satisfied are you with your overall life in general on a scale from 1 to 10 with 1 = *poorly satisfied* and 10 = *very satisfied*?" as indicated by Ferrans et al. (2005).

Protection of Human Subjects

In this study, I worked diligently to keep information confidential by adhering to the Health Insurance Portability and Accountability Act (HIPAA) guidelines and maintaining participants' anonymity with description and survey data. Institutional review board (IRB) approval from Walden University was obtained prior to conducting research in order to ensure that participants' rights and safety are met and maintained in accordance with the University's identified standards. Participants in this study were assured of the confidentiality involved in this research process. Demographic information collected was not to be divulged in relation to participation in this study. There were no personal identifiers listed on the survey tool. The survey databases were secured in a locked file cabinet area in the researcher's home for complete confidentiality. This research study was voluntary and all participants had the right to refuse to participate in the study at any time. Participants were asked to review a consent form prior to beginning the study. Upon review of the consent form participants were made aware that by accessing the survey link they would be providing their consent to participate in the study project. Subsequently, I did not collect paper consent forms from the study participants. However, participants were able to print and save a personal copy of the consent form for future reference, if so desired.

Data Collection Procedures

A convenience sampling method was utilized from the women who volunteered to be a part of the study because subjects were accessible through the identified organizations. The processes involved in the research study was as follows: following IRB approval to conduct research, the leadership teams of RGR, MRACDST, and SMLACDST were contacted via email to request dissemination of the survey link to their members and affiliates.

Participants were recruited from members of MRACDST, SMLACDST and women affiliated with RGR. A contact person from each of the leadership teams of MRACDST, SMLACDST, and RGR was identified. The identified contact person(s) for each organization placed an informational announcement in the organizations' weekly announcement bulletins to explain the study and seek participants. The announcement introduced me to the members of both DST chapters and women of RGR. The announcement also highlighted information about the study and the criteria for participation, which required participants to be African American women, aged 30 to 45, with a current diagnosis of UF, able to give informed consent, able to read and understand English, no history of surgical treatment for UF, have access to the internet, and able to answer an electronic survey. Potential participants were asked to go online by accessing the identified web link to an established web based system (Survey Monkey) to review the consent form, SI form, DI form, and the survey. An electronic version of the Walden University consent (see Appendix A) form was used in the database for participants to review and with a detailed statement that the participant have informally consented to be in the study by completing the SI form and all subsequent survey forms thereafter. Study participants were prompted to review the consent form prior to participation in the study in order to ensure that all participants understood that participation in the study was voluntary. More importantly, it also indicated that they are not required to participate in the study because of their membership or affiliation with the participating organizations. Participants were made aware that they had the right to discontinue the study at any time. No identification markers were used. Contact information for the researcher was made available electronically to the participants upon entry into the web based survey to provide an opportunity for participants to address any questions related to the survey content.

Upon entry to the web based survey link, participants were prompted to review a set of instructions outlining procedures for completing the SI Form, DI form, and UFS-QOL survey electronically in order to maintain a standardized method of survey completion. The set of instructions made participants aware that all information obtained in the SI form, DI form, and UFS-QOL survey was confidential and those forms instructed them not to include self-identifying information. Because the topic of this study required some information of a private nature, it was extremely important to maintain participant comfort and confidentiality while minimizing the potential for participant embarrassment and reluctance to participate. Participants were prompted initially to complete the SI form in order to ensure they meet all of the inclusion criteria for participation in the study. Those study participants who did not meet the inclusion criteria after completion of the SI form were instructed to stop and were not allowed to proceed with completion of the DI form or UFS-QOL survey instrument.

After completion of the SI form, those participants who did meet the study inclusion criteria were prompted to move forward with completion of the DI form and the UFS-QOL 37- item survey instrument as best they can. All study participants were instructed to answer questions based upon their current level of understanding and familiarity of the subject content. Once participants complete the DI form and UFS-QOL survey they were prompted to submit the completed form and survey electronically.

Participants were provided with the number and name of a local mental health resource to follow up should they become distressed after completion of the survey and desire to seek professional assistance; however, this was not an expected reaction.

I selected an established web based system (Survey Monkey) to aide in transferring the testing instruments, screening information and demographic form on line. Emails were sent to MRACDST, SMLACDST, and RGR with a request for them to distribute directly to their members and affiliates the survey information. The survey information included the identified survey web link which asked individuals to complete the survey electronically in order to maximize access to all potential participants. Utilizing the electronic data collection method afforded this researcher the opportunity to administer the survey to multiple parties, offered the ease of being able to take the survey at a time that is convenient for the participants, supported participants' confidentiality, and was cost effective. I believe that the electronic survey method was the most advantageous for this study project. Moreover, because the topic of this study was of a private nature, it was extremely important for me to maintain participant comfort and confidentiality while minimizing the potential for participant embarrassment and reluctance to participate. Therefore, the electronic survey process was selected because of the need to limit participant bias, maximize access to the entire participant pool, and administration of one survey questionnaire was potentially more effective for the participants.

Data Analysis

Initially, the data were checked and verified with the electronic data files to ensure accuracy for data entry. The data were then examined for data inaccuracies such as abnormal data entry (e.g. survey response > 5) and missing survey response values. After review and verification of the data using an excel spreadsheet, survey entries that were noted to contain inadequate and missing data were systematically excluded from the data analysis.

There were two phases to data analysis, descriptive and inferential. In the first phase of the analyses, descriptive statistics were used to determine means and the standard deviation to describe the continuous variable (age). Frequency and percent was used to describe the responses to the survey items. For the second phase of the analyses, regression was used to answer the research questions and determine if there was a relationship between the identified variables (BMI, symptoms, functional status, general health perception, and HRQOL). Statistics software, SPSS version 20.0 for Windows was used for all statistical analysis (IBM SPSS Inc., 2011). A *p* value less than 0.05 was considered significant.

Assumptions for Linear Regression

1. The relationship between the dependent variable (DV) and independent variable (IV) is linear. This assumption was tested by examining the scatter plot. If the plot of the data points falls in a line or at least oval or oblong shape the assumption of a linear relationship was supported.

2. Homoscedasticity (the errors have the same variance; Leech, Barrett, & Morgan, 2005). This assumption was tested by examining the plots of the standardized residuals against the predicted values. If the plots are approximately rectangle around the middle y = 0 line, the assumption of homoscedasticity was supported.
3. The errors are independent of each other: Durbin-Watson Statistic was used to test this assumption. The value of the Durbin-Watson statistic ranges from 0 to 4 (Leech, Barrett, & Morgan, 2005). As a general rule of thumb, the residuals are not correlated if the Durbin-Watson statistic is approximately 2 (an acceptable range is 1.50 - 2.50; Leech, Barrett, & Morgan, 2005). If the Durbin-Watson statistic falls in this range, the assumption that the errors are independent was supported.
4. The errors or residual are normally distributed residuals: This assumption was tested using the Shapiro-Wilk test of studentized residuals. If the *p*-value of the Shapiro-Wilk statistics was greater than .05 the assumption that the errors are normally distributed was supported (Leech, Barrett, & Morgan, 2005).

Assumptions for Multiple Regressions

The assumptions for linear regression also apply to multiple regressions and will be tested as indicated above.

Of most concern with multiple regressions is multicollinearity. This is not an assumption as such, but is of concern when conducting multiple regression analyses. High inter-correlation among the IVs can result in multicollinearity. Multicollinearity results in unstable equation coefficients. The following steps were followed to check for multicollinearity:

1. Correlation matrix was calculated and constructed in order to examine the correlations of the IVs to the DV and the inter-correlations among the IVs. An outcome of high correlations between the DV and each IV and low inter-correlations among the IVs indicates that multicollinearity does not exist.
2. Examine the Tolerance: A Tolerance close to 0 indicates multicollinearity. The cut-off used was 0. If the Tolerance was more than 0.1, multicollinearity among the IVs does not exist.

The following research questions and hypotheses were developed and used in order to explore the severity of UF symptoms and the impact of UF symptoms on HRQOL (see Table 2):

Table 2

Research Questions, Study Variables, and Data Analysis

RESEARCH QUESTIONS	STUDY VARIABLES	DATA ANALYSIS
RQ 1: What is the association between symptom severity, as measured by the UFS-QOL instrument, and concern (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?	Dependent: Concern (summed score of questions 9, 15, 22, 28, 32 on the survey); Independent : Symptom Severity (summed score of questions 1-8 on the survey)	Linear Regression
RQ 2: What is the association between symptom severity, as measured by the UFS-QOL instrument, and activities (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?	Dependent: Activities (summed score of questions 10, 11, 13, 19, 20, 27, 29 on the survey); Independent: Symptom Severity (summed score of questions 1-8 on the survey)	Linear Regression

Table 2 Continues

RQ 3: What is the association between symptom severity, as measured by the UFS-QOL instrument, and energy/mood (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?	Dependent: Energy/mood (summed score of questions 12, 17, 23, 24, 25, 31, 35 on the survey); Independent: Symptom Severity (summed score of questions 1-8 on the survey)	Linear Regression
RQ 4: What is the association between symptom severity, as measured by the UFS-QOL instrument, and control (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?	Dependent: Control (summed scores of questions 14, 16, 26, 30, 34 on the survey); Independent: Symptom Severity (summed score of questions 1-8 on the survey)	Linear Regression
RQ 5: What is the association between symptom severity, as measured by the UFS-QOL instrument, and self-consciousness (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?	Dependent: Self-consciousness (summed score of 18, 21, 23 on the survey); Independent: Symptom Severity (summed score of questions 1-8 on the survey)	Linear Regression

Table 2 Continues

RQ 6: What is the association between symptom severity, as measured by the UFS-QOL instrument, and sexual function (a dimension of HRQOL) among African American women ages 30 to 45 years diagnosed with UF?	Dependent: Sexual function (summed scores of questions 36 and 37 on the survey); Independent: Symptom Severity (summed score of questions 1-8 on the survey)	Linear Regression
RQ 7: What is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women ages 30 to 45 years diagnosed with UF?	Dependent Variable: HRQOL score (sum score of 6 subscale scores range from 29 to 145); Independent: Symptom Severity (summed score of questions 1-8 on the survey) and BMI – overall calculated value based on participants height and weight (participants response to two questions on DI form: question #2- What is your height? and question #3- What is your weight?)	Hierarchical multiple Regression
RQ8: When controlling for characteristics of the individual (age) what is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women ages 30 to 45 years diagnosed with UF?	Dependent Variable: HRQOL score (sum score of 6 subscale scores range from 29 to 145); Independent: Symptom Severity (summed score of questions 1-8 on the survey) and BMI – overall calculated value based on participants height and weight (participants response to two questions on DI form: question #2- What is your height? and question #3- What is your weight?) Co-variant-Characteristics of the Individual: Age (participant's response to one question about age #1 on the DI form)	Hierarchical multiple Regression

Table 2 Continues

RQ9: When controlling for characteristics of the environment (family hx of UF diagnosis and employment) what is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women ages 30 to 45 years diagnosed with UF?	Dependent Variable: HRQOL score (sum score of 6 subscale scores range from 29 to 145); Independent: Symptom Severity (summed score of questions 1-8 on the survey) and BMI – overall calculated value based on participants height and weight (participants response to two questions on DI form: question #2- What is your height? and question #3- What is your weight?) Co-variants-Characteristics of the Environment: A) Family History of UF diagnosis (participant's response to one family history of UF diagnosis question #5 on the DI form). B) Employment (participant's response to question # 4 on the DI form: Yes, No, I do not know).	Hierarchical multiple Regression
RQ 10: What is the association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF?	Dependent Variable: General health perceptions (participants response to one global question #7 on the DI form- "How would you rate your current health on a scale from 1 to 10 (with 1 = poor and 10 = excellent) Independent: HRQOL score (sum score of 6 subscale scores range from 29 to 145) and Symptom Severity (summed score of questions 1-8 on the survey).	Hierarchical multiple Regression

Table 2 Continues

RQ11: When controlling for characteristics of the individual (age) what is the association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF?	Dependent = General health perceptions (participants response to one global question #7 on the DI form- “How would you rate your current health on a scale from 1 to 10 (with 1= poor and 10 = excellent)?”). Independent = HRQOL score (sum of 6 subscale scores range 29 to 145) and Symptom Severity (summed score of questions 1-8 on the survey). Co-variant-Characteristics of the Individual: Age (participant’s response to one question about age #1 on the DI form).	Hierarchical multiple Regression
RQ 12: When controlling for characteristics of the environment (family hx of UF diagnosis and employment) what is the association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF?	Dependent = General health perceptions (participants response to one global question #7 on the DI form- “How would you rate your current health on a scale from 1 to 10 (with 1= poor and 10 = excellent)?”). Independent = HRQOL score (sum of 6 subscale scores range 29 to 145) and Symptom Severity (summed score of questions 1-8 on the survey). Co-variants-Characteristics of the Environment: A) Family History of UF diagnosis (participant’s response to one family history of UF diagnosis question #5 on the DI form). B) Employment (participant’s response to question # 4 on the DI form: Yes, No, I do not know).	Hierarchical multiple Regression

Table 2 Continues

RQ 13: What is the association between symptom severity as measured by the UFS-QOL instrument and overall quality of life among African American women age 30 to 45 years diagnosed with UF?	Dependent = Overall quality of life (response to one global question #8 on the DI form- ‘How satisfied are you with your overall life in general on a scale from 1 to 10 (with 1 = poorly satisfied and 10 = very satisfied)?”) Independent = Symptom Severity (summed score of questions 1-8 on the survey).	Linear Regression

Summary

Throughout this chapter, broad information regarding the design of the study was presented. An inclusive description that detailed the target population, protection of human subjects and information pertaining to the instrument that was used to analyze data is addressed. In addition, the data analysis plan was presented. The data analysis plan addressed and examined components of the thirteen hypotheses and explored the research questions. Chapter 4 presents the data analysis, interpretation of data and provide a summarization of the overall results of the study. Chapter 5 will communicate the summary, possible implications, conclusion and recommendation(s) for further research.

Chapter 4: Results

Introduction

The purpose of the current chapter is to present the results from the statistical analyses performed to address the research questions from this study. A description of the final sample size is followed by descriptive statistics for the demographic and environmental variables from this study. In addition, the HRQOL variables, methods used to examine each of the questions, and the results of the tests derived from the linear and multiple regression analyses from this study is described. The chapter ends with a summary of the key findings from this study.

Sample

All three of the participating organizations (MRAC DST, SMLAC DST, and RGR) received a recruitment letter via email. In the email, the organizations were asked to send out the survey link in their weekly correspondence to their members and affiliates. After four months of data collection a total of 103 survey entries were received. The data were initially checked to ensure that the entries met the study inclusion criteria based on responses to the screening questions and were checked for accuracy in data responses. Four screening questions were used to ensure that only women who met the inclusion criteria were allowed to complete the survey. Based on the survey screening questions, all 103 participants identified their race as African American. Of those 103 respondents, 3 indicated they had not been informed they had a diagnosis of uterine fibroids by a medical professional and they were excluded from the study. Two respondents indicated they were outside of the age requirements for the study, 53 years and 47 years, both were excluded from the study. Sixteen respondents replied ‘yes’ that they had received treatment for their uterine fibroids and those 16 were not included in the study. A total of 21 survey entries were excluded because they did not meet the study inclusion criteria based on their responses to the 4 screening questions. In addition, 2 survey entries were excluded for incomplete data responses. In total, 23 survey entries were excluded from this study, leaving a total of 80 respondents who were included in the study.

Ninety-two participants were estimated to have 80% power to detect a medium effect f^2 equal to 0.15 with 5 predictor variables at a significance of 0.05. It is important to note the estimated sample size of 92 was initially based on the target population size of 1,600 women (the total number of women available from all three participating organizations). In chapter 3 however, it was noted that of those 1,600, only approximately 316 women would be eligible to participate in the study project based on their age and diagnosis of UF. After the data were collected and reviewed for accuracy it was evident that the obtained study sample of n= 80 was less than the estimated sample size. Therefore, it was determined that a post hoc power analysis was needed. A post hoc power analysis using G*Power (Faul et al., 2009) was used to calculate the post hoc power for the hierarchical regression to ensure that the obtained study sample size of 80 would be able to adequately power the study. Post hoc analysis demonstrated with an n = 80, medium effect f^2 equal to 0.15, and alpha = 0.05, the post hoc power was .87 or 87%. Therefore, the obtained sample size (n = 80) was enough to adequately power the study because it reflects the true power for the study based on the sample obtained from the actual target population size.

Descriptive Statistics

The data were checked and verified using the electronic data file to ensure accuracy for data entry. The data were examined using frequencies for data inaccuracies such as abnormal data entry (e.g., survey response >5) and there were none. After review and verification of the data using the Excel spreadsheet, 23 survey entries were systematically excluded from the data analysis because they failed to meet the study inclusion criteria prior to the final sample size being established.

Descriptive statistics for the demographic physical characteristics of the participants are shown in Table 3. The participants had a mean age of 39.2 years with a mean height of 64.1 inches (5 feet 4 inches). The Body Mass Index (BMI) mean for the participants of this study was 30.8. Of the total number of participants in the study 20% reported a weight class which placed them in the category of being overweight with a calculated BMI range of 25 to 29.9. Another 46.25% of the participants fell into the obese category with a calculated BMI range of 30.0 or higher. It is important to note that according to the CDC (2013), a normal BMI range is 18.5 to 24.9.

Table 3

Physical Characteristics of the Participants

	N	Minimum	Maximum	Mean	Std. Dev.
Age	80	30	45	39.2	3.8
Height (in)	80	52	73	64.1	2.8
Weight (lbs)	80	107	298	180.1	40.0
BMI	80	19	51	30.8	7.0

Descriptive statistics for the demographic environmental characteristics of the participants are shown in Table 4. Participants were asked if they had missed work as a direct result of symptoms associated with uterine fibroids. Over one third of the participants indicated they had missed work due to uterine fibroid symptoms. Only participants that indicated they had a diagnosis of UF were asked to identify which family member(s) (mother, aunt, sister, grandmother) if any that also had a UF diagnosis. Participants were allowed to select multiple relatives or choose the option “I don’t know”, if they were unaware if one of the relatives listed had a UF diagnosis (see Table 4).

Table 4

Environmental Characteristics of the Participants

a. Missed work as direct result of uterine fibroid symptoms

Missed work?	Frequency	Percent
Yes	29	36.2
No	45	56.3
Don't know	4	5.0
Missing	2	2.5
Total	80	100.0

b. Immediate relative was diagnosed with uterine fibroids[a]

Relative	Frequency	Percent
Responses for total sample		
Any relative (yes)	55	68.7
Any relative (no)	14	17.5
Any relative (missing, DK)	11	13.8
Total	80	100.0
Responses for 55 women who indicated do they have a relative who was diagnosed with uterine fibroids[b]		
Mother	40	50.0
Aunt	26	32.5

Table 4 Continues

Grandmother	12	15.0
Sister	15	18.7
None	25	31.3

[a.] Respondents could have had more than one relative who had fibroids
[b.] percent of total sample of 80 respondents

Symptom Severity and HRQOL Scale Descriptives

The purpose of the UFS-QOL is to obtain information related to UF symptom severity and HRQOL along six subscales of categories from women who are diagnosed: concern, activities, energy/mood, control, self-consciousness, and sexual function (Harding et al., 2008; Spies et al., 2002). The 37- item survey instrument was used to assess the severity of symptoms among African American women with UF and the impact of UF symptoms on HRQOL. The UFS- QOL survey questionnaire is based on a 5- point Likert-type scale. The survey is divided into two sections: symptom severity and HRQOL.

Symptom severity. The first set of questions of the survey is the symptom severity section. The range for the average response was from 8 to 40 with a mean of 24.4 (SD 7.7, see Table 5). The midpoint total score was 24 for the symptom severity scale descriptive. The mean midpoint total score for symptom severity in this study was statistically significant and it fell to the right of the midpoint score. A midpoint total score of 24. 4 for symptom severity suggested that, on average, the respondents felt somewhat distressed by the severity of symptoms associated with their uterine fibroids.

Table 5

Scores and Scale Descriptives for UFS-QOL Questionnaire

Scale	N	Minimum	Maximum	Mean	Std. Dev
Symptoms[a]	80	8.0	40.0	24.4	7.7
Concern[b]	80	3.0	25.0	14.6	7.1
Self consciousness[b]	80	3.0	15.0	7.8	3.4
Energy/mood[b]	80	6.0	29.0	17.9	6.9
Sexual function[b]	80	2.0	10.0	5.1	2.4
Activities[b]	80	6.0	34.0	17.4	8.3
Control[b]	80	4.0	21.0	11.5	4.8
HRQOL total[b]	80	29.0	129.0	74.2	29.3

[a] scale – 1=not at all, 2=a little bit, 3= somewhat, 4=a great deal, 5=a very great deal

[b] scale - 1=none of the time, 2=a little of the time, 3=some of the time, 4=most of the time, 5=all of the time

HRQOL. Section 2 of the survey evaluated the impact of factors associated with HRQOL and consisted of 27 questions. This section included questions that were categorized into one of six subsections: concern, activities, energy/mood, control, self-conscious, and sexual function. The combined raw scores from each subscale represented the total score for HRQOL section and ranged from 29 to 145 (with scores closer to 145 reflecting greater negative impact on health related quality of life, see Table 5). The six HRQOL scales have a different number of items and thus different possible scores. The response for each subscale variable are highlighted in Table 5.

Concern. There were 5 questions related to concern on the UFS-QOL survey instrument. Topics addressed under this variable consisted of problems related to soiling clothing and undergarments, soiling bed linens, unpredictability of onset of menses, and the inconvenience of having to carry additional feminine hygiene products (Spies et al., 2002). The calculated midpoint total score for the subscale variable concern was 15. In this study the participants mean midpoint total score for concern was 14.6 (SD 7.1, see Table 5). The total score for concern was statistically significant in this study based on linear regression analysis; however, it did fall slightly to the left of the midpoint score. Nevertheless, the summed score for concern in this study implied that, the respondents on average did have concern some of the time regarding the severity of UF symptoms they experienced.

Self-consciousness. There were 3 questions related to self-consciousness on the UFS-QOL survey instrument. Topics addressed under this variable consisted of problems related to weight gain, physical appearance, and clothing size (Spies et al., 2002). The calculated midpoint total score for the subscale variable self-consciousness was 9. In this study the participants mean midpoint total score for concern was 7.8(SD 3.4, see Table 5). Even though the total score for self-consciousness fell to the left of the midpoint score it was statistically significant in this study based on linear regression analysis. These study findings indicate that between a little to some of the time on average the respondents felt self-conscious regarding the severity of UF symptoms they experienced.

Energy/mood. There were 7 questions related to energy/mood on the UFS-QOL survey instrument. Matters addressed under this variable consisted of problems related to feelings of being tired, drowsy, sleepy, sad, hopeless or discouraged, irritable, and feeling weak (drained, Spies et al., 2002). The calculated midpoint total score for the subscale variable energy/mood was 21. In this study the participants mean midpoint total score for energy/mood was 17.9 (SD 6.9, see Table 5). Even though the total score for energy/mood fell to the left of the midpoint score, based on linear regression analysis it was found to be statistically significant in this study. These study findings suggest between a little to some of the time on average the respondents felt their energy/mood was adversely impacted by the severity of UF symptoms they experienced.

Sexual function. The average response ranged from one to five with a mean response of 2.5. There were 2 questions related to sexual function on the UFS-QOL survey instrument. Topics addressed under this variable were avoidance of sexual activity and diminished sexual desire (Spies et al., 2002). The calculated midpoint total score for the subscale variable sexual function was 6. In this study the participants' mean midpoint total score for sexual function was 5.1 (SD 2.4, see Table 5). Even though the total score for sexual function fell to the left of the midpoint score it was statistically significant in this study based on linear regression analysis. These study findings indicate between a little to some of the time the respondents on average felt their sexual function was diminished and avoided sexual relations as a result of the severity of UF symptoms they experienced.

Activities. There were7 questions related to activities on the UFS-QOL survey instrument. Questions under this variable addressed a number of activities that related to traveling, exercise, social activities, usual daily activities and the planning of those activities (Spies et al., 2002). The calculated midpoint total score for the subscale variable activities was 21. In this study the participants mean midpoint total score for energy/mood was 17.4 (SD 8.3, see Table 5). The subscale variable activities was found to be statistically significant using linear regression analysis, even though it fell to the left of the midpoint total score. In this study, the findings indicated that, between a little to some of the time the respondents on average felt their ability to carry out activities such as those listed previously was limited by the severity of UF symptoms they experienced.

Control. There were 5 questions related to control on the UFS-QOL survey instrument. This variable addressed feelings related to the lack of control a person may feel over their personal health, life, and how untimely symptoms could alter plans for social engagements, travel or physical activity (Spies et al., 2002). The calculated midpoint total score for the subscale variable control was 15. In this study the participants mean midpoint total score for energy/mood was 11.5 (SD 4.8, see Table 5). Using linear regression analysis Control was found to be statistically significant in this study with a midpoint total score of 11.5. In this study, the findings indicated that, between a little to some of the time the respondents on average felt their control to plan and predict their activities and life events was limited by the severity of UF symptoms they experienced.

Total HRQOL. There were no questions related directly to the total HRQOL of the participants on the UFS-QOL survey instrument. The total HRQOL score is a sum of the 6 subscale scores. The calculated midpoint total HRQOL score was 87. In this study the participants mean midpoint total HRQOL score was 74.2 (SD 29.3, see Table 5) and it fell to the left of the midpoint score. The mean midpoint total HRQOL score of 74.2, though less than the calculated midpoint score was statistically significant in this study. The total HRQOL summed scored in this study indicates that between a little to some of the time the respondents felt their total HRQOL was adversely impacted by the severity of UF symptoms they experienced.

Test of Statistical Assumptions

Prior to conducting regression analyses to address the research questions and test the hypotheses, the assumptions for all of the research questions in this study were tested. The assumptions of linear regression were tested to assess the relationship between the dependent variables (DV) and the independent variable (IV) in research questions 1-6 and 13. The assumptions of hierarchical multiple regressions were tested to assess the relationship between the DV and IVs in research questions 7-12. The four assumptions for the regression analyses that were addressed were linearity, homoscedasticity, independence of errors, and normality.

To test for normality of the scale scores, skewness was examined. According to Leech (2005), if the skewness is between -1 and +1, the distribution is approximately normal. In this study all the scale score had skewness between -1 and +1, indicating the distributions are approximately normal (see Table 6). Therefore, recoding for entry into the model was not required for the linear and multiple regressions analyses.

Table 6

Skewness for Scale Scores on Health Related Quality of Life Questionnaire (HRQOL)

Scale	N	Skewness[a]
Symptoms	80	-.041
Concern	80	.054
Self-consciousness	80	.061
Energy/mood	80	-.079
Sexual function	80	.341
Activities	80	.342
Control	80	.329
HRQOL total	80	.010

[a] skewness between -1 and +1 indicates distribution is approximately normal.

Linear Regression Assumptions Research Questions 1-6 and 13

Linearity. The assumption of linearity was assessed by examining scatter plots. The correlations of symptom severity (IV) and the HRQOL subscales (DV) are displayed in Table 6. This method was used to identify if the association between symptoms severity (IV) and the 6 HRQOL subscale variables (DVs) were statistically significant. Statistical significance were identified when the p- value for the association between variables was < 0.05. Bivariate correlations showed a strong positive correlation between symptom severity and all 6 of the HRQOL subscale variables (see Table 7). All of the correlations of the IV to the DVs are significant indicating that symptom severity has a linear relationship with all of the HRQOL sub scale variables. Therefore the question of if there was an association between the IV and DV was supported in research questions 1-6.

Table 7

Correlations of HRQOL Scales with Symptom Severity

Scale	Severity
Concern	.576**
Activities	.581**
Energy mood	.614**
Control	.590**
Self-conscious	.505**
Sexual	.443**

$^{**}p < .01$, n =80

For research question 13, the correlation of symptom severity (IV) and the overall quality of life (DV) is displayed in Table 8 (r = .627). The correlation of the IV to the DV is not significant indicating that the IV (symptom severity) does not have a linear relationship or association with the DV (overall quality of life). Therefore the assumption of an association between symptom severity and overall quality of life in research question 13 was not supported.

Table 8

Correlations of Overall Quality of Life with Symptom Severity

	SymptomSeverity
Overall quality of life	.627**

$^{**}p < .01$, n= 80

Homoscedasticity. The assumption of homoscedasticity (the errors have the same variance) was tested by examining the plots of the standardized residuals against the predicted values. The plots of the standardized residuals against the predicted values in research questions 1- 6 were constructed (see Appendix F, Figures 1 - 6). If the plots are approximately rectangle around the middle y = 0 line, the assumption of homoscedasticity is supported. The plots in Appendix F, Figures 1-6 were approximately rectangular around the middle y = 0. Therefore the assumption of homoscedasticity of variance is supported in research questions 1-6.

Appendix I, Figure 13 displays the plot of the standardized residuals against the predicted values for research question 13. If the plots are approximately rectangle around the middle y = 0 line, the assumption of homoscedasticity is supported. The plot in Appendix 1, Figure 13 was approximately rectangular around the middle y = 0. Therefore the assumption of homoscedasticity of variance is supported in research question 13.

Independence of errors. The assumption of independence of error was assessed with Durbin- Watson statistic. The Durban -Watson statistic was used to test for independence in research questions 1-6. The acceptable range for the Durban-Watson statistic is between 1.50 and 2.50 (Leech, Barrett, & Morgan, 2005). The Durban-Watson statistics for all of the hypotheses tests were within this range. Therefore the assumption that the errors are independent was supported in research questions 1-6 (see Table 9).

Table 9

Summary of Assumptions Support for Research Question 1 - Research Question 6, & Research Question 13

RQ	Relation[a]	Homoscedasticity[b]	Residuals Independent[c]	Residuals Normal[d]
1	Yes	Yes	2.03	.98 (.201)
2	Yes	Yes	1.83	.98 (.247)
3	Yes	Yes	1.71	.94 (.001)
4	Yes	Yes	1.70	.97 (.031)
5	Yes	Yes	2.00	.99 (.895)
6	Yes	Yes	2.15	.99 (.937)
13	Yes	Yes	1.78	.93(.000)

[a] refer to correlation matrix in Table 7 & 8; n= 80
[b] refer to the scatterplots in Appendix F & I, Figures 1 – 6, 13
[c] Durban-Watson statistic - an acceptable range is 1.50 - 2.50
[d] Shapiro-Wilk statistic - .ss(.ppp) .ss = Shapiro-Wilk statistic, .ppp = probability, .ppp> .05 supports the hypothesis

The Durban -Watson statistic was also used to test for independence in research question 13. The acceptable range for the Durban-Watson statistic is between 1.50 and 2.50 (Leech, Barrett, & Morgan, 2005). The Durban-Watson statistic for RQ13 was within this range (Durban-Watson = 1.78). Therefore the assumption that the errors are independent was supported in research question 13 (see Table 9).

Errors of normality. The assumption of normality was assessed by using the Shapiro-Wilk test of studentized residuals for research questions 1-6. The Shapiro-Wilk statistic was used to test for normality of the residuals. If the *p* is greater than .05 the assumption that the distribution for the residuals is normal is supported. For four of the six hypotheses p > .05 (RQ 1, 2, 5, 6) indicating the residual distributions were normal. For these four tests the assumption of normality of the residuals was supported. For RQ 3 and RQ 4 p <.05 indicating the residual distributions were not normal. For these two tests the assumption of normality of the residuals was not supported. When

> … some procedures can provide very reliable results even when an assumption is not fully met. In such cases a condition may offer a rule of thumb that indicates whether or not we can safely override the assumption and apply the procedure anyway. (Bock, 2014, *Distinguish Between Assumptions and Conditions,* ¶ 3).

If the histogram is approximately unimodal and symmetric the condition that the distribution is nearly normal is supported (Bock, 2014). As the assumption of normality is not supported by Shapiro-Wilk, an examination of the histograms for RQ 3 and RQ 4 was carried out to see if the histograms were approximately unimodal and symmetric (see Figures 2 – 3). Both distributions are unimodal and approximately symmetric. Therefore the condition of normality is supported in research questions 3-4.

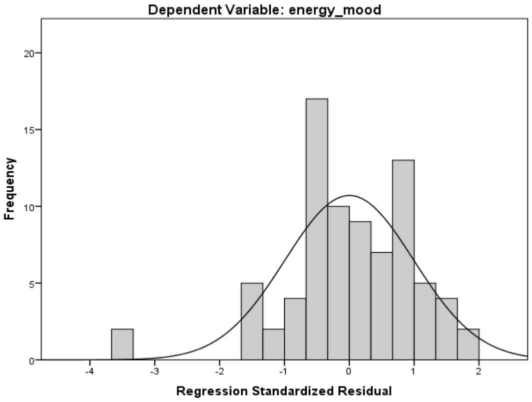

Figure 2. Histogram of RQ3 standardized residuals.

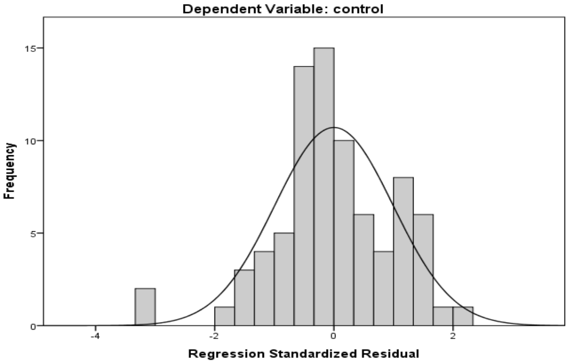

Figure 3. Histogram of RQ4 standardized residuals.

The Shapiro-Wilk statistic was also used to test for normality of the residuals in research question 13. If the *p* is greater than .05 the assumption that the distribution for the residuals is normal is supported. For RQ13 p < .05 indicating the residual distributions was not supported. As the assumption of normality was not supported by Shapiro-Wilk, an examination of the histogram for RQ 13 was carried out to see if the histogram was approximately unimodal and symmetric (see Figure 4). The distributions was unimodal and approximately symmetric. Therefore the condition of normality is supported in research question 13.

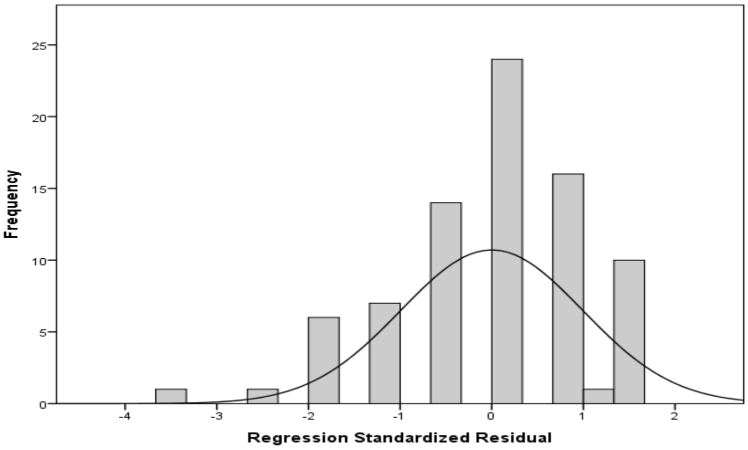

Figure 4. Histogram of RQ13 standardized residuals.

Multiple Regression Assumptions Research Questions 7-9

The assumptions for linear regression also apply to multiple regressions and were tested as indicated previously. The assumptions of multiple regressions were tested to assess the ability of the model to see if there was a relationship between symptom severity, BMI, and HRQOL, along with three covariates (age, family history of uterine fibroids, and employment) in research questions 7-9. The four assumptions of multiple regressions that were addressed were linearity, homoscedasticity, independence of errors, and normality.

Linearity. The assumption of linearity was assessed by examining scatter plots. The relationship between the DV and IV is linear. The correlations of the HRQOL total score (DV) with the IV (symptom severity, BMI) and covariates (age, relative, missed work) are displayed in Table 10. This approach was also used to identify if the association between symptoms severity, BMI, HRQOL total score and the three covariates were statistically significant. Statistical significance was identified when the p- value for the association between variables was < 0.05. Bivariate correlations showed a positive correlation between symptom severity, BMI, and employment history with the HRQOL total score (see Table 10). All the correlations of the IVs to the DV are significant indicating that the IVs (symptom severity and BMI) have a linear relationship with the DV (HRQOL total score). Therefore, the assumption of an association between the IVs and DV was supported. However, for the covariates only employment history had a significant correlation with the HRQOL total score.

Table 10

Correlations of HRQOL Total Score with Symptom Severity, BMI, and Demographics

Variable	HRQOL Total
^{a}Severity of Symptoms	.627**
^{a}BMI	.218*
^{a}Age	.109
^{b}Employment History	.392**
^{b}Family History	-.056

* $p < .05$ **$p < .01$
^{a} n = 80, ^{b} n = 77

Homoscedasticity. The assumption of homoscedasticity (the errors have the same variance) was tested by examining the plots of the standardized residuals against the predicted values. The plots of the standardized residuals against the predicted values were constructed (see Appendix G, Figures 7 - 9). If the plots are approximately rectangle around the middle, y = 0 line, the assumption of homoscedasticity is supported. The plots in Appendix G, Figures 7-9 were approximately rectangular around the middle y = 0. Therefore the assumption of homoscedasticity of variance is supported.

Independence of errors. The assumption of independence of error was assessed using the Durbin- Watson statistic. The Durban -Watson statistic was used to test for independence. The acceptable range for the Durban-Watson statistic is between 1.50 and 2.50 (Leech, Barrett, & Morgan, 2005). The Durban-Watson statistics for all of the hypotheses tests were within this range. Therefore the assumption that the errors are independent was supported (see Table 11).

Table 11

Summary of Assumptions Support for Research Question 7 - Research Question 9

RQ	Relation[a]	Homoscedasticity[b]	Residuals Independent[c]	Residuals Normal[d]
7[e]	yes	Yes	1.76	.936 (.001)
8[e]	Yes	Yes	1.76	.934 (.000)
9[f]	Yes	Yes	1.81	.942 (002)

[a]refer to correlations in Table 12,
[b]refer to the scatterplots in Appendix G, Figures 7 - 9
[c]Durban-Watson statistic - an acceptable range is 1.50 - 2.50
[d]Shapiro-Wilk statistic - .sss(.ppp) .sss = Shapiro-Wilk statistic, .ppp = probability or *p*-value, a *p*-value > .05 indicates the residuals are distributed normally
[e] RQ 7-8 n = 80
[f] RQ 9 n = 77

Errors of Normality. The assumption of normality was assessed by using the Shapiro-Wilk test of studentized residuals. The Shapiro-Wilk statistic was used to test for normality of the residuals. If the p is greater than .05 the assumption that the distribution for the residuals is normal is supported. For all three hypotheses $p < .05$ indicating the residual distributions were not normal. For these tests the assumption of normality of the residuals was not supported. If the histogram is approximately unimodal and symmetric the condition that the distribution is nearly normal is supported (Bock, 2014). As the assumption of normality was not supported by Shapiro-Wilk, an examination of the histograms for the residuals was carried out to see if the histograms were approximately unimodal and symmetric (see Figures 5 – 7). All three of the distributions are unimodal and approximately symmetric. Therefore the condition of normality is supported in research questions 7-9.

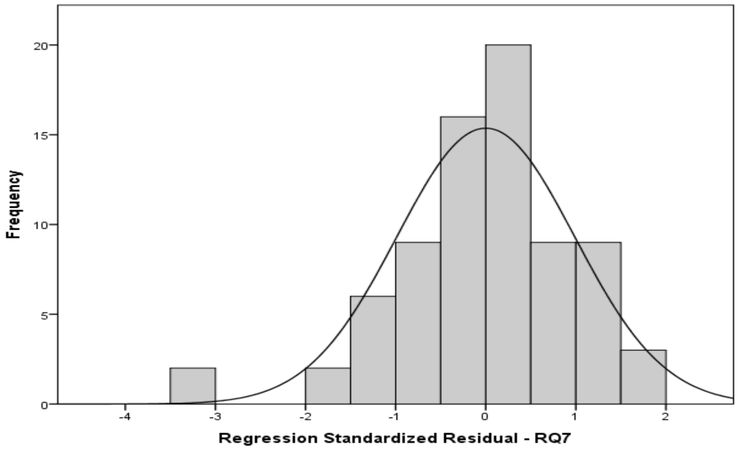

Figure 5. Histogram of RQ7 standardized residuals.

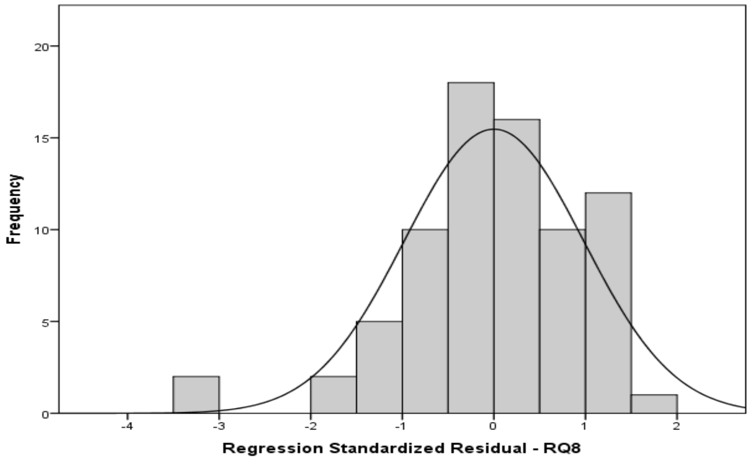

Figure 6. Histogram of RQ8 standardized residuals.

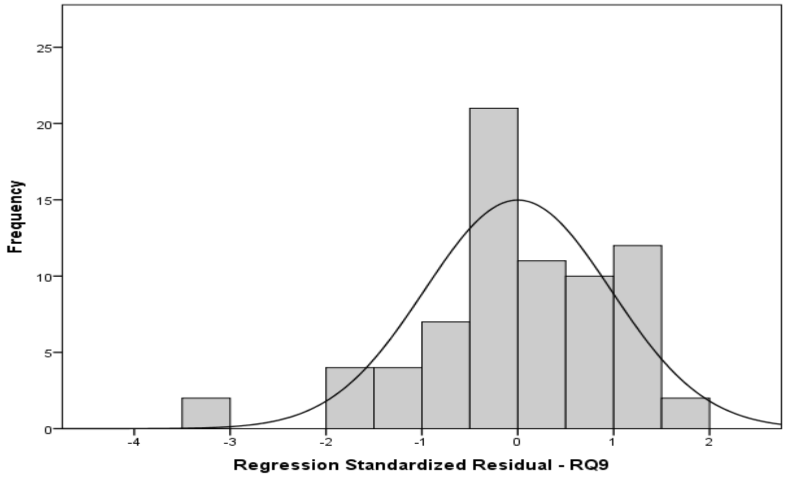

Figure 7. Histogram of RQ9 standardized residuals.

Of most concern with multiple regressions is multicollinearity. This is not an assumption as such, but is of concern when conducting multiple regression analyses. High inter-correlation among the IVs can result in multicollinearity. Multicollinearity results in unstable equation coefficients. Therefore, correlation matrix and tolerance were used to examine for multicollinearity.

Correlation Matrix. The correlation matrix was constructed in order to examine the correlations of the IVs to the DV and the inter-correlations among the IVs (see Table

12). An outcome of high correlations between the DV and each IV and low inter-correlations among the IVs indicates that multicollinearity does not exist. The correlation of the DV (total HRQOL score) and the IVs (symptom severity and BMI) were significant. The correlation between the IVs (symptom severity and BMI) was not significant. The inter-correlations among the IVs and the covariates were all insignificant except between severity of symptoms and employment history, and between age and family history. The correlations were small; therefore, the tolerance results were examined as a test for multicollinearity.

Table 12

Intercorrelations of HRQOL Total Score and the IVs

Variable	1	2	3	4	5	6
1. HRQOL Total[a]		.627**	.218*	.109	.392**	-.056
2. Severity Symptoms[a]			.144	.019	.283*	-.039
3. BMI[a]				-.028	.128	.016
4. Age[a]					.061	-.251*
5. Employment History[b]						-.171
6. Family History[b]						

* $p < .05$ **$p < .01$
[a] n =80
[b] n = 77

Tolerance. In Table 13, the calculations for the Tolerance are listed. A Tolerance close to 0 indicates multicollinearity. The cut-off used was 0. If the Tolerance is more than 0.1, multicollinearity among the IVs does not exist. For all three Regressions, the tolerances for the IVs and the covariates were all greater than 0.8 indicating that multicollinearity does not exist among the IVs and the covariates. Because the tolerance results were so high they were used as the test for the existence of multicollinearity.

Table 13

Tolerance to Test for Multicollinearity of the IVs for Research Questions 7 - 9

RQ	Severity[a]	BMI[a]	Age[b]	Family[b]	Work[b]
7[c]	.979	.979			
8[c]	.979	.987	.999		
9[d]	.903	.969		.968	.879

Note. A Tolerance greater than 0.1 indicates multicollinearity does not exist
[a]Independent variable
[b]Covariate
[c] n= 80
[d] n= 77

Multiple Regressions Assumptions Continued Research Questions 10-12

The assumptions for linear regression also apply to multiple regressions and were tested as indicated previously. The assumptions of multiple regressions were tested to assess the ability of the model to see if there is a relationship of symptom severity and HRQOL total score with general health perception in research question 10. The assumptions of multiple regressions were tested to assess the ability of the model to see if there is a relationship of symptom severity and HRQOL total score with general health perception, along with three covariates (age, family history of uterine fibroids, and employment history of missed work due to uterine fibroids) in research questions 11-12. The four assumptions of multiple regressions that were addressed were linearity, homoscedasticity, independence of errors, and normality.

Linearity. The assumption of linearity was assessed by examining scatter plots. The correlations of the perception of general health (DV) with the IV (symptom severity, HRQOL total score) and covariates (age, family history, & employment history) are displayed in Table 14. This method was also used to identify if the association between general health perception, symptoms severity, HRQOL total score and the three covariates were statistically significant. Statistical significance were identified when the p- value for the association between variables was < 0.05. Bivariate correlations showed only the IV HRQOL total score was significantly correlated with the DV (perception of general health) indicating HRQOL has a linear relationship with the DV (r = -.254, p = .023). The negative correlation indicates that as the HRQOL score (higher score indicates higher impact of uterine fibroids with the respondent's health related quality of life) increased, the rating for general health (higher rating indicates higher perception of general health) decreased. Severity of symptoms was not significantly correlated with the DV (perception of general health) indicating that the IV (symptom severity) does not have a linear relationship with the DV (r = -.191, p = .090). Therefore the assumption of an association between the IVs and DV was supported for HRQOL total score, but not for symptom severity. None of the covariates had a significant correlation with the DV (perception of general health).

Table 14

Correlations of Perception of General Health with Symptom Severity, HRQOL Total Score, and Demographics (n=80)

Variable	General Health
Severity Symptoms	-.191
HRQOL Total	-.254*
Age	.015
Employment History	-.090
Family History	-.061

* $p < .05$

Homoscedasticity. The assumption of homoscedasticity (the errors have the same variance) was tested by examining the plots of the standardized residuals against the predicted values. The plots of the standardized residuals against the predicted values were constructed (see Appendix H, Figures 10 - 12). If the plots are approximately rectangle around the middle y = 0 line, the assumption of homoscedasticity is supported. The plots in Appendix H, Figures 10-12 were approximately rectangular around the middle y = 0. Therefore the assumption of homoscedasticity of variance is supported.

Independence of errors. The assumption of independence of error was assessed with Durbin- Watson statistic. The Durban -Watson statistic was used to test for independence. The acceptable range for the Durban-Watson statistic is between 1.50 and 2.50 (Leech, Barrett, & Morgan, 2005). The Durban-Watson statistics for all of the hypotheses tests were within this range. Therefore the assumption that the errors are independent was supported (see Table 15).

Table 15

Summary of Assumptions Support for Research Question 10 - Research Question 12

RQ	Relation[a]	Homoscedasticity[b]	Residuals Independent[c]	Residuals Normal[d]
10	Mixed	Yes	1.85	.942 (.001)
11	Mixed	Yes	1.83	.944 (.002)
12	Mixed	Yes	1.88	.942 (002)

[a] refer to correlations in Table 14
[b] refer to the scatterplots in Appendix H, Figures 10 - 12
[c] Durban-Watson statistic - an acceptable range is 1.50 - 2.50
[d] Shapiro-Wilk statistic - .sss(.ppp) .sss = Shapiro-Wilk statistic, .ppp = probability or *p*-value, a *p*-value > .05 indicates the residuals are distributed normally

Errors of Normality. The assumption of normality was assessed by using the Shapiro-Wilk test of studentized residuals. The Shapiro-Wilk statistic was used to test for normality of the residuals. If the *p* is greater than .05 the assumption that the distribution for the residuals is normal is supported. For all three hypotheses p < .05 indicating the residual distributions were not normal (see Table 15). For these tests the assumption of normality of the residuals was not supported. If the histogram is approximately unimodal and symmetric the condition that the distribution is nearly normal is supported (Bock, 2014). As the assumption of normality was not supported by Shapiro-Wilk, an examination of the histograms for the residuals was carried out to see if the histograms were approximately unimodal and symmetric (see Figures 8 – 10). All three of the distributions are unimodal and approximately symmetric. Therefore the condition of normality is supported for research questions 10-12.

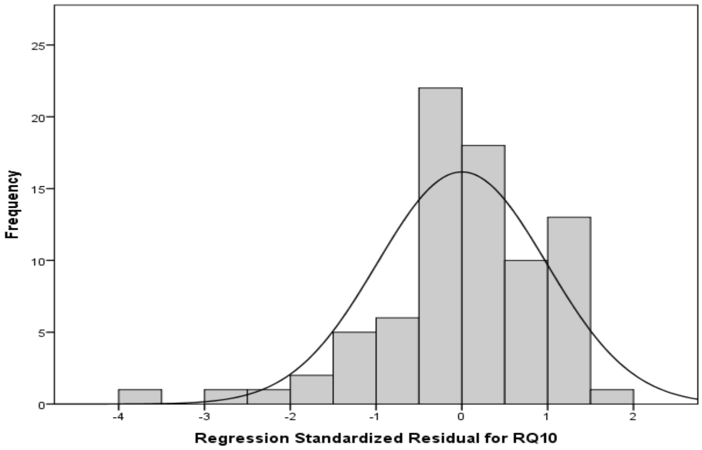

Figure 8. Histogram of RQ10 standardized residuals.

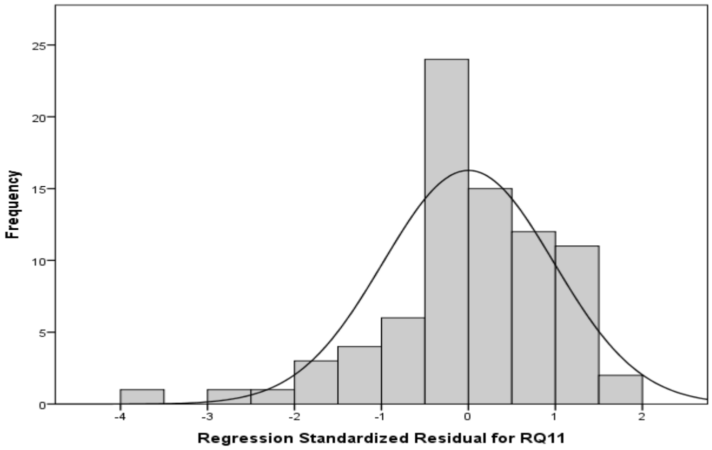

Figure 9. Histogram of RQ11 standardized residuals.

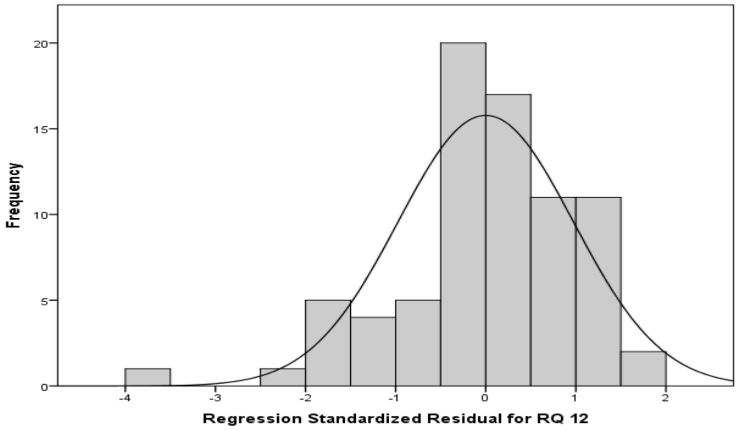

Figure 10. Histogram of RQ12 standardized residuals.

Correlation Matrix. The correlation matrix was constructed in order to examine the correlations of the IVs to the DV and the inter-correlations among the IVs (see Table 16). An outcome of high correlations between the DV and each IV and low inter-correlations among the IVs indicates that multicollinearity does not exist. The correlation of the DV (perception of general health) and the IV (total HRQOL) was significant. The correlation of the DV (perception of general health) and the IV (symptom severity) was not significant. The correlations between the IVs (symptom severity and total HRQOL score) were significant. There were significant inter-correlations among the IVs and covariates (symptom severity and employment history, total HRQOL and employment history, age and family history). The correlations were small; therefore, the tolerance results were examined as a test for multicollinearity

Table 16

Intercorrelations of Perception of General Health and the IVs

Variable	1	2	3	4	5	6
1. Perception of general health		-.191	$-.254^{*}$	.015	-.090	-.061
2. Severity Symptoms			$.627^{**}$	.019	$.283^{*}$	-.039
3. Total HRQOL				.109	$.392^{**}$	-.056
4. Age					.061	$-.251^{*}$
5. Employment History						-.171
6. Family History						

* $p < .05$

Tolerance. In Table 17 the calculations for the Tolerance are listed research questions 10-12. A Tolerance close to 0 indicates multicollinearity. The cut-off used was 0. If the Tolerance is more than 0.1, multicollinearity among the IVs does not exist. For all three Regressions, the tolerances for the IVs and the covariates were all greater than 0.55 indicating that multicollinearity does not exist among the independent variables and the covariates. Because the tolerance results were so high they were used as the test for the existence of multicollinearity.

Table 17

Tolerance to Test for Multicollinearity of the IVs for Research Questions 10 - 12

RQ	Severity[a]	HRQOL Total[a]	Age[b]	Family[b]	Work[b]
10[c]	.607	.607			
11[c]	.598	.605	.984		
12[d]	.598	.553		.970	.819

Note. A Tolerance greater than 0.1 indicates multicollinearity does not exist
[a]Independent variable
[b]Covariate
[c] n = 80
[d] n = 77

Test of Hypotheses and Results of Data Analyses

Linear Regression Analyses Research Questions 1-6

To test the first six hypotheses, linear regression analysis was used. In the linear regression analysis symptom severity was used as IV and the six HRQOL subscale variables (concern, activities, energy/mood, control, self- consciousness, sexual function), as measured by the UFS-QOL were used as the DV (See Table 18). The objective of the first six research questions was to examine the association between symptom severity and the six HRQOL subscale variables (concern, activities, energy/mood, control, self-consciousness, sexual function), as measured by the UFS-QOL.

Variables

The independent variable for all six regressions used in questions 1 – 6 was symptom severity. The symptom severity score was obtained based on the total sum response of questions 1-8 as measured by the UFS-QOL instrument. The dependent variables for questions 1- 6 were the individual summed scores for each of the 6 subscale variables. Concern was the DV in question 1, control was the DV in question 2, activities was the DV for question 3, energy/mood was the DV for question 4, sexual function was the DV for question 5, and self-consciousness was the DV for question 6. The 6 subscale variables were measured by the UFS-QOL instrument.

Table 18

Simple Linear Regression Results for HRQOL Scales Regressed on Symptom Severity

Scale	B	SE B	β	*F*	*p*	*Adj* $^aR^2$
Concern	.849	.137	.576	38.72	.000	.323
Activities	.721	.114	.581	39.78	.000	.329
Energy/mood	.645	.094	.614	47.19	.000	.369
Control	.596	.092	.590	41.71	.000	.340
Self-consciousness	.610	.118	.505	26.71	.000	.246
Sexual function	.563	.129	.443	19.03	.000	.186

[a] Same size for all regressions n=80

Test of Hypotheses Research Questions 1-6

The specific goal of the first six research questions was to examine the association between symptom severity and the six HRQOL subscale variables (concern, activities, energy/mood, control, self- consciousness, sexual function), as measured by the UFS-QOL.

Research Question 1: What is the association between symptom severity, as measured by the UFS-QOL instrument, and concern (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

Results

The null hypothesis was not retained, F (1, 78) = 38.72, $p < .001$. There is a significant association between concern and severity of symptoms. The coefficient (B = .849) is positive, indicating that as the severity of symptoms increases, concern about the adverse impact of their uterine fibroid symptoms on their life also increases. Adj. R^2 = .323 indicating that severity of symptoms accounts for 32.3% of the variability in concern about soiling.

Research Question 2: What is the association between symptom severity, as measured by the UFS-QOL instrument, and activities (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

Results

The null hypothesis was not retained, F (1, 78) = 39.78, $p < .001$. There is a significant association between activities and severity of symptoms. The coefficient (B = .721) is positive, indicating that as the severity of symptoms increases, the negative impact on their activities due to their uterine fibroid symptoms also increases. Thereby suggesting that participants in this study are likely to decrease their activities as their severity of symptoms increases. Adj. R^2 = .329 indicating that severity of symptoms accounts for 32.9% of the variability in the impact on activities.

Research Question 3: What is the association between symptom severity, as measured by the UFS-QOL instrument, and energy/mood (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

Results

The null hypothesis was not retained, F (1, 78) = 47.19, $p < .001$. There is a significant association between energy/mood and severity of symptoms. The coefficient (B = .645) is positive, indicating that as the severity of symptoms increases, the negative impact on the respondent's energy/mood also increases. Adj. $R^2 = .369$ indicating that severity of symptoms accounts for 36.9% of the variability in impact on the respondent's energy/mood.

Research Question 4: What is the association between symptom severity, as measured by the UFS-QOL instrument, and control (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

Results

The null hypothesis was not retained, F (1, 78) = 41.71, $p < .001$. There is a significant association between control and severity of symptoms. The coefficient (B = .596) is positive, indicating that as the severity of symptoms increases, the negative impact on the respondent's feeling of control of their life also increases. Adj. $R^2 = .340$ indicating that severity of symptoms accounts for 34.0% of the variability in the impact on their control of their life.

Research Question 5: What is the association between symptom severity, as measured by the UFS-QOL instrument, and self-consciousness (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

Results

The null hypothesis was not retained, F (1, 78) = 26.71, $p < .001$. There is a significant association between self-consciousness and severity of symptoms. The coefficient ($B = .610$) is positive, indicating that as the severity of symptoms increases, their negative feelings of self-conscious relating to their uterine fibroid symptoms also increases. $R^2 = .246$ indicating that severity of symptoms accounts for 24.6% of the variability in their feeling of self-conscious relating to their uterine fibroid symptoms.

Research Question 6: What is the association between symptom severity, as measured by the UFS-QOL instrument, and sexual function (a dimension of HRQOL) among African American women age 30 to 45 years diagnosed with UF?

Results

The null hypothesis was not retained, F (1, 78) = 19.03, $p < .001$. There is a significant association between sexual function and severity of symptoms. The coefficient ($B = .563$) is positive, indicating that as the severity of symptoms increases, the negative impact on their sexual function due to their uterine fibroid symptoms also increases. $R^2 = .186$ indicating that severity of symptoms accounts for 18.6% of the variability in the impact on their sexual function due to their uterine fibroid symptoms.

Hierarchical Multiple Regression Analyses Research Questions 7-9

The objective of the second set of research questions (7-9) was to examine the association between the total HRQOL summed score as measured by the UFS-QOL with symptom severity and BMI when controlling for age, employment, and family history. Hierarchical multiple regression analysis was used on questions 8 and 9 to determine if there is a relationship between symptom severity, BMI, and HRQOL, when controlling for three covariates (age, family history of uterine fibroids, and employment) (See Table 18). The dependent variable was the total HRQOL summed score for all three research questions. The independent and control variables were added to the model in steps. In order to determine what the control variables, then symptom severity, and lastly BMI each contributed to the model, they were added in the following three steps:

1) In step one, the covariate, characteristics of the individual (RQ 8 - age), and characteristics of the environment (RQ9 - family history of UF diagnosis, and employment history of missed work due to uterine fibroids) were added to the model and the change in R^2 was examined.
2) In step two, the variable symptom severity was added to the model and the change in R^2 was examined to determine whether or not symptom severity significantly increased $R^{2.}$
3) In step three, the variable BMI was added to the model and the change in R^2 was examined to determine whether or not BMI significantly increased R^2.

Variables

Dependent = Total HRQOL summed score as measured by the UFS- QOL instrument.

Independent (all three hierarchical regressions) = Symptom Severity and BMI

The three covariates were:

1) Age (characteristics of the individual). This co variant was used in RQ8.
2) Family History of uterine fibroid diagnosis (this co variant was used in RQ9). For regression analysis, family history was coded as 1 = yes and 0 = no, missing or don’t know.
3) Employment (this co variant was used in RQ9). For regression analysis, employment history was coded as 1 = yes and 0 = no, did not miss work.

Table 19

Hierarchical Regression Results for HRQOL Scales Regressed on Demographics, Symptom Severity, and BMI

Scale	B	SE B	β	*F*	R^2	ΔR^2
		a. Research Question #7 (n=80)				
Step 1 Symptom Severity	.664**	.093	.627	50.47**	.393	
Step 2 Symptom Severity	.644**	.094	.608	26.71**	.410	.017
BMI	.019	.013	.131			
		b. Research Question #8 (n=80)				
Step 1 – Age	.029	.030	.109	.93	.012	
Step 2 – Age	.026	.023	.097	25.91**	.402	.390**
Symptom Severity	.662**	.092	.625			
Step 3 - Age	.027	.023	.101	18.33**	.420	.018
Symptom Severity	.642**	.094	.606			
BMI	.019	.013	.134			
		c. Research Question #9 (n=77)				
Step 1 – Employ. history	.835**	.229	.396	6.76**	.154	
Family history	.045	.239	.020			
Step 2 – Employ. history	.483**	.195	.229	19.68**	.447	.293**
Family history	.031	.195	.014			
Symptom Severity	.599**	.096	.566			

Table 19 Continues

Step 3 – Employ. history	.460*	.195	.218	15.15***	.457	.010
Family history	.020	.195	.009			
Symptom Severity	.587**	.097	.557			
BMI	.015	.013	.101			

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

Test of Hypotheses Research Questions 7-9

The specific goal of question 7 was to examine the associations between symptom severity, body mass index (BMI), and overall HRQOL. The specific goals of research questions 8 and 9 were to examine the associations between symptom severity, body mass index (BMI), and overall HRQOL, controlling for the three co-variables (age, family hx of UF, and employment).

Research Question 7: What is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women ages 30 to 45 years diagnosed with UF?

Variables

Dependent = total summed HRQOL score

Independent = Symptom Severity and BMI

Results

In step 1 with the IV symptom severity being added, the model was significant, F (1, 78) = 50.47, $p < .001$. $R^2 = .393$. Specifically, symptom severity does contribute to the prediction of total HRQOL summed score. In step 2 with the addition of BMI the model remained significant F (2, 77) = 26.71, $p < .001$. $R^2 = .410$ with the change in $R^2 =.017$ ($p = .144$) which was not significant. The non-significant change in R^2 indicates that the addition of BMI does not increase explanation of the variability in total HRQOL. BMI does not contribute to the prediction of total HRQOL. The coefficient for symptom severity ($B = .644$) was significant and positive, indicating that as the severity of symptoms increases, the negative impact on total HRQOL also increases.

Research Question 8: When controlling for characteristics of the individual (age) what is the association between symptom severity as measured by the UFS-QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF?

Variables

Dependent = Total HRQOL summed score

Independent = Symptom Severity and BMI

Co-variable

Characteristics of the Individual or age (the only co variable in this category).

Results

In step 1 with the addition of age, the model was not significant, F (1, 78) = .93, $p = .337$. Age does not contribute to the prediction of total HRQOL summed score. In step 2 with addition of symptom severity, the model was significant, F (2, 77) = 25.91, $p < .001$. $R^2 = .402$ with the change in $R^2 = .390$, $p < .001$. The significant change in R^2 indicates that the addition of symptom severity significantly increases the explanation of the amount of variability in total HRQOL. In step 3 with the addition for BMI, the model was still significant *F* (3, 76) = 18.33, $p < .001$. $R^2 = .420$ with the change in $R^2 = .018$ ($p = .134$) which was not significant. The non-significant change in R^2 indicates that the addition of BMI does not increase explanation of the variability in total HRQOL. Neither age nor BMI were found to have a significant association with total HRQOL summed score. Only symptom severity significantly added to the model. The coefficient for symptom severity ($B = .642$) was significant. It is positive, indicating that as the severity of symptoms increases, the negative impact on total HRQOL increases (indicated by higher total HRQOL summed score).

Research Question 9: When controlling for characteristics of the environment (family history of UF diagnosis and employment history of missed work due to uterine fibroids) what is the association between symptom severity as measured by the UFS- QOL instrument, BMI, and HRQOL total score as measured by the UFS-QOL instrument among African American women age 30 to 45 years diagnosed with UF?

Variables

Dependent = Total HRQOL summed score.

Independent = Symptom Severity and BMI

Co- variables

Characteristics of the Environment

Family history of UF diagnosis. For regression analysis, family history was coded as 1 = yes and 0 = no, missing or don’t know. Two of the participants did not respond to this question.

Employment history of missed work due to uterine fibroids. For regression analysis, employment history was coded as 1 = yes and 0 = no, did not miss work. One of the participants did not respond. Because a total of 3 participants did not respond to these questions, the sample size for this regression was n=77 instead of n=80.

Results

In step 1 with the addition of employment and family history, the model was significant, *F* (2, 74) = 6.76, *p* = .002. It is important to note that while the overall model was significant when the control variables were added, the coefficient for family history (B = .045, p = .852) was not significant. Family history did not contribute to the prediction of total HRQOL score. However, the coefficient for employment (B = .835, *p* < .001) was significant indicating that employment history was related to total HRQOL summed score. Employment history was coded 1 = yes – missed work, and 0 = no – did not miss work. For employment “yes” indicates the participant has missed work because of uterine fibroid symptoms. The positive coefficient indicates that as employment history or days missed from work increases (moves from 0 to 1) the total HRQOL summed score also increases. The positive relationship between the total HRQOL summed score and employment indicates that the participants who missed work due to uterine fibroid symptoms experienced an increased negative impact on their total HRQOL (indicated by a higher total HRQOL summed scores). In step 2 with the addition of symptom severity the model was significant, *F* (3, 73) = 19.68, *p* < .001. R^2 = .447 with the change in R^2 = .293, *p* < .001. The significant change in R^2 indicates that the addition of symptom severity significantly increases the explanation amount of variability in total HRQOL. In step 3 with addition for BMI, the model was still significant F (4, 72) = 15.15, $p < .001$. $R^2 = .457$ with the change in $R^2 =.010$ ($p = .254$) which was not significant. The non-significant change in R^2 indicates that the addition of BMI does not increase explanation of the variability in total HRQOL summed score. Only employment history and symptom severity significantly contributed to total HRQOL. The coefficient for symptom severity ($B = .587$) was significant. The association is positive, indicating that as the severity of symptoms increases, the negative impact on total HRQOL also increases (indicated by a higher total HRQOL summed score).

Hierarchical Regression Analyses continued: Research questions 10-12

The objective of the third set of research questions (10-12) was to examine the association between general health perception with symptom severity and total HRQOL score as measured by the UFQOL when controlling for demographics (age, family history, employment history) (see Table 20). Hierarchical multiple regression analysis was also used in research questions 11-12, to determine if there was a relationship of symptom severity and HRQOL total score with general health perception, controlling for three covariates (age, family history of uterine fibroids, and employment history of missed work due to uterine fibroids). The dependent variable was general health perception for all three research questions. In order to determine what the control variables, then symptom severity, and lastly total HRQOL contributed to the model, the variables were added to the model in the following three steps:

1) In step one, for RQ11 only the control variable age, and for RQ12 only the two control variables family history and employment history were added to the model and the change in R^2 was examined.
2) In step two the variable symptom severity was added to the model and the change in R^2 was examined to determine whether or not symptom severity significantly increased R^2.
3) In step three the variable total HRQOL summed score was added to the model and the change in R^2 was examined to determine whether or not HRQOL significantly increased R^2.

Variables

Dependent variable = General health perception

Independent variables (all three hierarchical regressions) = Symptom severity and Total HRQOL summed score.

The three covariates were:

1) Age (this co variant was used in RQ11).
2) Family History of uterine fibroid diagnosis (co variant was used in RQ12). For regression analysis, family history was coded as 1 = yes and 0 = no, missing or don’t know.
3) Employment (this co variant was used in RQ12). For regression analysis, employment history was coded as 1 = yes and 0 = no, did not miss work.

Table 20

Hierarchical Regression Results for Perception of General Health Regressed on Demographics, Symptom Severity, and Total HRQOL Score

Scale	B	SE B	β	*F*	***R²***	***ΔR²***
a. Research Question #10 (n=80)						
Step 1 Symptom Severity	-.311	.181	-.191	2.94	.036	
Step 2 Symptom Severity	-.085	.231	-.052	2.72	.066	.030
Total HRQOL Score	-.341	.218	-.221			
b. Research Question #11 (n=80)						
Step 1 – Age	.006	.046	.015	.018	.000	
Step 2 – Age	.008	.045	.019	1.47	.037	.037
Symptom Severity	-.312	.183	-.191			
Step 3 - Age	.017	.045	.041	1.84	.068	.031
Symptom Severity	-.079	.232	-.049			
Total HRQOL Score	-.351	.221	-.228			
c. Research Question #12 (n=77)						
Step 1 – Employ. History-	-353	.381	-.108	.558	.015	
Family history	-.263	.398	-.077			
Step 2 – Employ. History	-.188	.395	-.058	1.06	.042	.027
Family history	-.256	.396	-.075			

Table 20 Continues

Symptom Severity	-.280	.196	-.172			
Step 3 – Employ. History	-.015	.408	-.004	1.39	.072	.030
Family history	-.245	.392	-.072			
Symptom Severity	-.065	.240	-.040			
Total HRQOL Score	-.359	.236	-.233			

Test of Hypotheses Research Questions 10-12

The specific goal of question 10 was to examine the association between symptoms severity, HRQOL total score, and general health perception. The specific goals for research questions 11 and 12 was to examine the association between symptom severity, total HRQOL summed score, and general health perception, controlling for the three co variables (age, family history of uterine fibroids, and employment history).

Research Question 10: What is the association between symptom severity as measured by the UFS-QOL instrument, HRQOL total score as measured by the UFS-QOL instrument and general health perception among African American women age 30 to 45 years diagnosed with UF?

Variables

Dependent = General health perception

Independent = Symptom severity and Total HRQOL summed score

Results

In step 1 with the addition of the IV symptom severity, the model was not significant, F (1, 78) = 2.94, p = .090. R^2 = .036. Specifically symptom severity did not contribute to the prediction of general health perception. In step 2 with the addition of total HRQOL summed score, the model remained insignificant F (2, 77) = 2.72, p = .072. R^2 = .066 with the change in R^2 =.030 (p = .122) which was not significant. The non-significant change in R^2 indicates that the addition of total HRQOL summed score does not increase explanation of the variability in general perception of health.

Research Question 11: When controlling for characteristics of the individual (age) does symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument have an association with general health perception among African American women age 30 to 45 years diagnosed with UF?

Variables

Dependent = General health perception

Independent = Symptom severity and Total HRQOL summed score

Co-variable

Characteristics of the Individual or age (the only co variable in this category).

Results

In step 1 with the addition of age, the model was not significant, F (1, 78) = .02, p = .892. The non-significant change indicates that age does not contribute to the prediction of general health perception. In step 2 with the addition of symptom severity the model was significant, F (2, 77) = 1.47, p = .237. R^2 = .037 with the change in R^2 = .037, p =

.092. The insignificant change in R^2 indicates that the addition of symptom severity does not significantly increase the explanation of the amount of variability in general health perception. In step 3 with the addition of total HRQOL summed score, the model was insignificant F (3, 76) = 1.84, p = .147. R^2 = .068 with the change in R^2 =.031 (p = .116) which was not significant. The non-significant change in R^2 indicates that the addition of total HRQOL summed score does not increase explanation of the variability in general health perception.

Research Question 12: When controlling for characteristics of the environment (family history of UF diagnosis and employment history) does symptom severity as measured by the UFS-QOL instrument, and HRQOL total score as measured by the UFS-QOL instrument have an association with general health perception among African American women age 30 to 45 years diagnosed with UF?

Variables

Dependent = General health perception

Independent = Symptom severity and Total HRQOL summed score

Co-variants-Characteristics of the Environment

Family history of UF diagnosis. For regression analysis, family history was coded as 1 = yes and 0 = no, missing or don’t know. Two of the participants did not respond to this question.

Employment history of missed work due to uterine fibroids. For regression analysis, employment history was coded as 1 = yes and 0 = no, did not miss work. One of the participants did not respond. Because a total of 3 participants did not respond to these questions, the sample size for this regression was n=77 instead of n=80.

Results

In step 1 with the addition of employment and family history, the model was not significant, *F* (2, 74) = .56, *p* = .575. Specifically employment nor family history were found to be a predictor of general health perception. In step 2 with the addition of symptom severity, the model was significant, *F* (3, 73) = 1.06, *p* = .371. R^2 = .042 with the change in R^2 = .027, *p* = .156. The insignificant change in R^2 indicates that the addition of symptom severity does not significantly increase the explanation of the variability in general perception of health. In step 3 with addition of total HRQOL, the model was remained significant *F* (4, 72) = 1.39, *p* = .246. R^2 = .072 with the change in R^2 =.030 (*p* = .132) which was not significant. The non-significant change in R^2 indicates that the addition of total HRQOL summed score does not increase explanation of the variability in general health perception.

Linear Regression Analyses Research Question 13

To test the last hypotheses/research question 13, linear regression analysis was used. In the linear regression symptom severity) was used as IV and Overall quality of life was the DV (see Table 21).

Table 21

Linear Regression Results for Overall quality of Life Regressed on Symptom Severity

Scale	B	SE B	β	*F*	*p*	*Adj* $^aR^2$
Symptom severity	-.040	.190	-.024	.05	.833	.012

[a] Adjusted for sample size, n = 80

Test of Hypotheses Research Question 13

The specific goal of RQ13 was to examine the association between symptom severity and overall quality of life.

Research Question 13: What is the association between symptom severity as measured by the UFS-QOL instrument and overall quality of life among African American women age 30 to 45 years diagnosed with UF?

Variables

Dependent: Symptom severity

Independent: Overall quality of life

Results

The null hypothesis was retained, *F* (1, 78) = .05, *p* = .833. There is no significant association between overall quality of life and severity of symptoms.

Summary

The purpose of this study was to explore the severity of symptoms associated with UF and the impact of UF symptoms on HRQOL of African American women ages 30 to 45 diagnosed with UF. A total of thirteen (13) research questions were developed and used in order to explore the severity of UF symptoms and the impact of UF symptoms on HRQOL using linear and multiple regression analyses. In this study, the following factors were investigated: BMI, symptom severity, functional status (concern, activities, energy/mood, control, self- consciousness, sexual function), overall quality of life, general health perception, characteristics of the individual (age), and characteristics of the environment (family hx of UF diagnosis and employment) among African American women age 30 to 45 years with a diagnosis of UF.

The overall goal for research questions 1 – 6 was to determine the association between symptom severity and the six HRQOL subscale variables (concern, activities, energy/mood, control, self- consciousness, sexual function) as measured by the UFS-QOL. The linear regressions for all the subscale scores indicated there is a significant association with the severity of symptoms and respondent's health related quality of life along the six subscale variables. Bivariate correlations showed a strong positive correlation between symptom severity and all 6 of the HRQOL subscale variables (see Table 7). All of the correlations of the IV to the DVs are significant indicating that symptom severity has a linear relationship with all of the HRQOL sub scale variables. Therefore, the null hypotheses related to research questions 1-6 were rejected.

The overall goal for research question 7 was to examine the association between the total HRQOL score as measured by the UFS-QOL with symptom severity and BMI using multiple hierarchical regression analysis. The overall goal for research questions 8 and 9 was to examine the association between the total HRQOL score as measured by the UFS-QOL with symptom severity and BMI, when controlling for demographics (age, family history, employment history) using multiple hierarchical regressions analyses. The three hierarchical regressions indicated there is a significant association with the severity of symptoms and employment (missed work due to uterine fibroid symptom). BMI and age did not significantly contribute to the models. R^2 for the final three models ranged from 41.0% to 45.7%. These relatively high R^2 indicate that the severity of symptoms and employment have a strong impact on the respondents' health related quality of life. Therefore, the null hypotheses related to research questions 7-9 were rejected.

The overall goal for research question 10 was to examine the association between the general perception of health score with symptom severity and HRQOL total score using multiple hierarchical regression analysis. The overall goal for research questions 11 and 12 was to examine the association between the general perception of health score with symptom severity and HRQOL total score, when controlling for demographics (age, family history, employment history) using multiple hierarchical regressions analyses. The three hierarchical regressions indicated there was no significant association of general health perception with the composite of the variables severity of symptoms, HRQOL total score, and employment history (missed work due to uterine fibroid symptom), and family history (relative diagnosed as having uterine fibroids. Specifically employment, nor family history were found to be a predictor of general health perception in questions 11 and 12. In questions 11 with the addition of symptom severity, the model was significant, F (3, 73) = 1.06, p = .371. R^2 = .042 with the change in R^2 = .027, p = .156. The insignificant change in R^2 indicates that the addition of symptom severity does not significantly increase the explanation of the variability in general perception of health. In question 12 with the addition of total HRQOL, the model was remained significant F (4, 72) = 1.39, p = .246. R^2 = .072 with the change in R^2 =.030 (p = .132) which was not significant. There was, however, a significant correlation between general perception of health and total HRQOL summed score. The correlation was negative, indicating the respondents felt a greater negative impact on their health related quality of life, as the rating of their general health perception decreased. Therefore, the null hypotheses related to research questions 10-12 were accepted.

The overall goal for research question 13 was to examine the association between symptom severity and overall quality of life using linear regression analysis. The linear regressions demonstrated there was not a significant association between the severity of symptoms and overall quality of life (F (1, 78) = .05, p = .833). Therefore, the null hypothesis related to research question 13 could not be rejected. In Chapter 5, interpretation of the findings in the context of the current literature and the overall summary are provided.

Chapter 5: Discussion, Conclusion, and Recommendations

This study of health related quality of life (HRQOL) was designed to explore the relationship between UF symptom severity and the impact of UF symptoms on HRQOL among 30 to 45 years old African American women diagnosed with UF. This chapter details the results of the data collected and the interpretations. A description of the implications of the study results with regard to social change and future research concludes the chapter.

Overview

The impact of UF symptoms on the HRQOL of women suggests this chronic condition can lead to a number of challenging social, physical, and emotional health concerns. Research findings corroborate that a disproportionate number of African American women are diagnosed with and treated for UF (Davis et al., 2009; ORWH, 2006; NIH, 2011; Wise et al., 2005b). More importantly, there is a disparity in the age at which African American women are diagnosed, and the symptoms that are experienced by African American women when compared to their counterparts from other racial backgrounds (Hartman et al., 2006; NIH, 2011; Wise et al., 2005a; 2005b). There are a lack of empirical studies exploring the severity of UF symptoms and the impact of UF symptoms on the HRQOL of African American women age 30 to 45 years.

The purpose of this study was to obtain empirical evidence from an existing population of African American women ages 30 to 45 years diagnosed with UF regarding the symptoms associated with UF and the impact of UF symptoms on their HRQOL. Using an exploratory, non- experimental research design, this study attempted to answer thirteen questions regarding the relationship between UF symptom severity and the impact of UF symptoms on HRQOL among African American women ages 30 to 45 years diagnosed with UF. This approach was suitable for this study because none of the independent variables (symptom severity, HRQOL, BMI, age, employment, and family history of UF diagnosis) were able to be logistically or ethically manipulated. The revised Wilson and Cleary model of HRQOL was used as the foundation for this study to investigate the following factors: BMI, symptom severity, functional status, overall quality of life, general health perception, characteristics of the individual, and characteristics of the environment among African American women age 30 to 45 years with a diagnosis of UF. The Uterine Fibroid Symptom and Health Related Quality of Life (UFS-QOL) designed by Spies et al. (2002) was used for this study. The survey is divided into two sections, with the first eight questions focusing on symptom severity and the remaining twenty seven questions evaluating the impact of factors associated with HRQOL.

Linear regression analyses were conducted to test hypotheses 1-6 and 13. Hierarchical multiple regressions analyses were conducted to test hypotheses 7-12. Assumptions of normality were applied. However, findings could not be generalized due to sampling limitations and a smaller than estimated sample size. Given the results of the analyses, 9 of the 13 null hypotheses were rejected. Following is an interpretation of findings within the context of this study project.

Interpretation of Findings

Uterine fibroid research has demonstrated that African American women are at a greater risk for diagnosis of UF when compared to their Caucasian and Asian counterparts. UF tumors cause an array of burdensome health problems which can negatively impact HRQOL. Multiple researchers have identified a number of symptoms and stressors among African American women with UF (Cabness, 2010; Lerner et al., 2008; Popovic et al., 2009). Some of these symptoms and stressors include but are not limited to increased fatigue, depressive symptoms, difficulty concentrating, negative impact on sexual life, and decreased performance at work (Cabness, 2010; Lerner et al., 2008; Popovic et al., 2009; Zimmerman et al., 2012). Researchers have found that more women with UF are actively seeking out information related to management of UF symptoms, less invasive surgical treatment options, and ways to preserve their fertility status in order to minimize the impact of UF on their lives (Khan, Shehmar, & Gupta, 2014). The physical and emotional burdens found to be associated with the presence of symptomatic UF among African American women ages 30 to 45 years can lead to undesirable effects on HRQOL.

Theoretical Framework Variables

This study sought to determine if there was a relationship between specific factors that influence HRQOL among women who have been diagnosed with UF. It also sought to offer a personalized perspective on how the lives of African American women ages 30 to 45 years are being impacted by UF symptoms. In the next section, interpretations of the study's findings within the conceptual framework that was used to investigate the following factors: symptoms, functional status, BMI, general health perception, characteristics of the individual (age), characteristics of the environment (family hx of UF and employment) and overall quality of life among African American women age 30 to 45 years with a diagnosis of UF (see Table 1) are addressed. This framework was the basis for exploring seven distinct UF condition categories: symptom severity, concern, activities, energy/mood, control, self-conscious, and sexual function, based on the UFS-QOL instrument (see Table 1).

Symptoms. The focus of these 8 questions was to determine how distressed the respondents were by the physical symptoms (e.g. heavy bleeding, fatigue, passing blood clots, frequent urination, changes in duration and length of monthly cycle) associated with UF. This measure was then used to help establish a basis for determining if symptom severity had an association with the respondents' functional status as measured by the six (6) HRQOL subscale variables in the first six research questions. When assessing the association of functional status, total HRQOL and employment history (missed time from work), there was a positive association with symptom severity. Research has found that symptoms such as pain and multiple bleeding episodes were found to have a negative impact on women's life (Zimmerman et al., 2012). Researchers Brito et al. (2014) also found in their study that symptomatic UF or the symptoms associated with UF (e.g. bleeding and pelvic pain) had a negative impact on the HRQOL for women in their study. The significance of symptom severity and its impact on total HRQOL in this study supports current research findings. While the results of these 8 questions alone was not specifically investigated for this project it was important to measure how the participants rated their personal experience with the symptoms associated with UF and if they believed those symptoms to be impactful to their lives.

Functional Status. Functional status was measured using the six HRQOL subscale variables (concern, activities, energy/mood, control, self- consciousness, sexual function) as measured by the UFS-QOL. The linear regressions for all the subscale scores indicated there is a significant association with the severity of symptoms and respondent's health related quality of life. Functional status was determined based the study participants mean score response to questions in each category of the six HRQOL subscale variables.

In each of the six questions the independent variable, symptom severity remained the same; however, the dependent variable was different in each question. In Hypothesis 1, the association between symptom severity and concern was examined. In Hypothesis 2, the association between symptom severity and activities was examined. In Hypothesis 3, the association between symptom severity and energy/mood was examined. In Hypothesis 4, the association between symptom severity and control was examined. In Hypothesis 5, the association between symptom severity and self-consciousness was examined. In Hypothesis 6, the association between symptom severity and sexual function was examined. The null hypotheses for all six questions in this section were rejected.

These study findings suggest that an association does exist among symptom severity and all of the health related quality of life subscale variables. However, the subscale variable Concern was identified as having an increased level of association with symptom severity when compared to the other subscale variables in this study. The concern subscale variable had a total of five questions. These five questions were designed to address the participants’ feelings or level of concern about issues related to the symptoms associated with UF. Topics such as anxiety due to unpredictability of onset or duration of monthly cycles, concern for soiling clothing and bed linens, and being inconvenienced about having to carry extra feminine products to avoid accidents were addressed (Spies et al., 2002). Brito et al. (2014) found participants in their study expressed feelings of concern more specifically “…huge sensations of fear” (p. 3) related to the unpredictability of symptoms associated with UF. Researcher Cabness (2010) also found that feelings of increased anxiety related to insecurity and shame of breakthrough bleeding prevented African American women with UF from attending social events. This study findings suggest that respondents increased level of concern appear to be consistent with current research findings related to UF symptom severity.

The subscale HRQOL variables, Self-conscious and Energy/mood both fell slightly left of the midpoint score for their respective categories. The three questions for self-conscious were designed to address how participants felt about some of the changes in their physical appearance or the impact of bulk symptoms on their HRQOL. Topics such as increase in abdominal girth or bloating, weight gain and having to wear larger size clothing were the common focus of the questions related to self- conscious (Spies et al., 2002). Research indicates that women diagnosed with UF are not only impacted by their experience with the physical symptoms associated with UF, but they also expressed among other problems, concerns related to body image, problems with sexual function, and relationships (Borah et al., 2013). The seven questions related to energy and mood addressed the emotional and physical barriers that women with UF often encounter. For example at least two of the three questions related to self- conscious inquired about bodily or physical changes that occur (e.g. weight gain, size and appearance of stomach). The difference between the two variables in this study though slight may reflect more on the participants' state of mind and the impact of UF symptoms on their outward appearance. More importantly it suggests there is a possible dissatisfaction participants may feel related to those negative physical changes that occur in their outward appearance.

Spies et al. (2002) found that women with UF who were unhappy about the physical appearance were also impacted in their sexual lives. However, researchers Ertunc, Uzan, Tok, Doruk, & Dilek (2009) study findings suggest that the pain and bleeding symptoms associated with UF may have more of a negative impact on the sexual life of women in their study. Participants in this study did indicate they felt an impact on their sexual function due to their uterine fibroid symptoms a little of the time to some of the time. This study findings appear to correlate with researchers Voogt et al. (2009) who found that premenopausal women with symptomatic UF expressed increased problems with sexual functioning (i.e. lubrication, orgasm and pain during intercourse) prior to having the UAE procedure for treatment of UF. Zimmerman et al. (2012) also found that 42.9% of the women in their study with UF expressed problems with sexual intercourse and that their sexual life was negatively affected. The researchers concluded that UF did have a negative influence on the participants' sexual life among other areas.

The findings of this study show that sexual life is somewhat impacted in a negative way by UF symptoms; however, this remains an area that requires further research.

The two subscale variables activities and control appear to also have a statistically significant association with symptom severity. The control subscale variable seeks to examine how participants feel about their ability to control their health, life, and future (Spies et al., 2002). In particular it addresses how the effects of UF symptoms "…could immediately alter all plans for travel, social engagements, or physical activities." (Spies et al., 2002, p 295). The researchers found that control was reported as one of the most areas affected the symptoms of UF in the lives of women diagnosed. Zimmerman et al. (2012) found that women in their study reported a mild to severe negative impact of UF symptoms on ability to perform various activities (e.g. housekeeping, sports, performance at work) in their life. In another study Brito et al. (2014) indicated that participants of their study had to change or limit their domestic and social activities as a result of the symptoms associated with UF. The results of the Brito et al. (2014) and Zimmerman et al. (2012) studies demonstrate the lack of ability to control UF symptoms can negatively influence the active and social of lives of women impacted by UF. Participants in this study indicated they felt the least impact in the subscale variable of control. These findings related to the subscale variable control are an interesting discovery given current research suggests that control is generally rated higher as an area of interest. However, in spite of its ranking the control sub variable is statistically significant in this study and indicates this is an area where respondents experience some level of negative impact in their HRQOL. This finding remains consistent with current literature.

Biological function. Body Mass Index (BMI) was the biological factor selected for this study. BMI did not significantly contribute to the regression model; however, it did have a significant correlation to total HRQOL (see Table 10). Specifically, the findings of the study suggest that even when controlling for the study covariate factors, age, family history of UF diagnosis, and employment, BMI continues to not have an association to the participant's HRQOL. The finding that BMI was not a significant contributor to the model was an interesting outcome of this study. To date, there are no published study findings that have found an association specifically between BMI and total HRQOL among women with UF, although researchers Trivedi and Abreo (2009) suggest that a relationship exists between UF diagnosis and higher BMI among women. Other researchers have also found an elevated BMI along with some other biological factors place African American women at an increased risk for developing UF (Faerstein, Szklo, & Rosenshein, 2001; Flake, Andersen, & Dixon, 2003; Wise et al., 2005). According to the CDC (2013) a normal BMI range is 18.5 to 24.9, 25 to 29.9 being classified as overweight and 30 or more being classified as obese. It is important to note the range of BMI for participants in this study was 19 to 51, with a mean of 30.8, with 46.25% of the participants falling into the obese category. Interestingly, the BMI findings of this study suggest most of the participants were African American women who meet the criteria for being classified as overweight or obese.

Characteristics of the individual. One characteristic of the individual was selected for inclusion in the study, age. The covariate age was not significant in any of the regression models. Research by the National Institute of Environmental Health

Sciences indicates that by the age of 50 years more than 80% of African American women and about 70% of Caucasian women in the United States would be affected by UF (Baird et al., 2003). Research findings from Davis et al. (2009) and Wise et al. (2005) have revealed that African American women between the ages of 25 to 45 years have a statistically significant ($p > 0.001$) greater risk of diagnosis of UF when compared to Caucasian women. Study inclusion criteria required that participants must be between the ages 30 to 45 years. The mean age for participants in this study was 39.2 years. Even though age did not significantly contribute to the model, it is important to note that this study participants mean average age is consistent with the age range (35 to 45 years) for African American women with the highest percentage of UF diagnosis (Davis et al., 2009; Peddada et al., 2008; Wise et al., 2005).

Characteristics of the environment. There were two characteristics of the environment selected for inclusion in the study: (a) family hx of UF diagnosis and (b) employment history. At least one characteristic of the environment did significantly contribute to the model.

***Family history of UF diagnosis*.** In this study family history did not contribute to any of the regression models, suggesting that family history of UF diagnosis did not impact HRQOL among the participants of this study. Over two thirds (67.8%) of the respondents in this study stated they had an immediate relative that had been diagnosed with uterine fibroids. Fifty percent of the participants identified their mother as the most common relative diagnosed with UF. Approximately 18.7% indicated they had a sister who had uterine fibroids. However, this percentage should be interpreted with care as all of the respondents did not report whether or not they had a sister. Researchers have found women who have a relative with a diagnosis of UF are at increased risk for UF development (Hyuck et al., 2008; Peddada et al., 2008; Scwhartz et al., 2000). Family history of UF diagnosis did not significantly contribute to any of the regression models. Therefore suggesting that family history of UF among African American women age 30 to 45 years and UF diagnosis in this study may not be related. It is important to note that research in this area is very limited and further research is required.

Employment history. In this study employment history did contribute to the regression models. More specifically, there was a significant association with the severity of symptoms and employment (missed work due to uterine fibroid symptom) and total HRQOL. In this study more than one in three of the respondents indicated they had missed work as a direct result of UF symptoms. The significance of employment history being impacted by symptoms associated with UF is an important finding. This study finding is similar to current research findings which have shown that decreased work productivity and work loss are common among women diagnosed with UF when compared to women without UF (Downes et al., 2010; Lerner et al., 2008; Pron et al., 2003). Brito et al. (2014) reported findings that the women in their study felt their professional activities were negatively impacted by the symptom associated with UF. Zimmerman et al. (2012) reported that performance at work was rated the second highest area that was negatively impacted by women with UF in their study. In their study, researchers Lerner et al. (2008) found among African American women with UF, reports of more difficulty managing physical and interpersonal job tasks, increased at- work productivity loss, increased fatigue, and difficulty concentrating were consistently higher when compared to Caucasian women in their study. When trying to evaluate health related quality of life among women with UF, results from the current study indicate it may be essential to understand the burden of UF on the livelihood and job performance of women diagnosed.

General health perceptions. General health perceptions was measured with one single global question which measured perception of health on a scale from 1= poor, to 10 = excellent. There was no significant association of general health perceptions with severity of symptoms, total HRQOL summed score, and employment history (missed work due to uterine fibroid symptom), and family history (relative diagnosed as having uterine fibroids). General health perceptions are described as the individuals' overall evaluation of the various aspects of their health and are highly personable (Wilson & Cleary, 1995). For this reason, general health perceptions were examined with multiple variables to determine how it may be impacted by various life factors. The insignificance of general health perceptions in this study is a surprising find, given that all six of the HRQOL subscale variables were significantly associated with symptom severity. Although general health perceptions did not contribute to total HRQOL summed score in this study, there was a significant correlation between general health perceptions and total HRQOL summed score. The correlation was negative, indicating that as the respondents felt a greater impact of uterine fibroids on their health related quality of life, their general health perceptions decreased.

Overall quality of life. For this study overall quality of life was measured using one question, “How satisfied are you with your overall life in general on a scale of 1 to 10 (with 1 = poorly satisfied and 10 = very satisfied)”. Though similar to general health perceptions given that both are individualized and subjective, the two concepts overall quality of life and general health perceptions do differ. The major difference is that overall quality of life is based on how happy or satisfied individuals may be with their life in total (Ferrans et al., 2005; Wilson & Cleary, 1995); whereas general health perception, is the individuals’ view on various aspects of their health. The literature reviewed suggests that quality of life for women diagnosed with UF can be negatively impacted by the symptoms associated (Spies et al., 2002; Williams et al., 2006). Cambridge and Sealy, (2012) suggest that African American women with symptomatic UF are often challenged with constant pain, embarrassment, and in some cases limited support systems which can negatively affect their life and sense of well-being. However, in this study the linear regressions indicated there was not a significant association between the severity of symptoms and overall quality of life. The findings for this study do not support current research findings as it relates to the impact of severity of UF symptoms and overall quality of life. Given the significant association between symptom severity and the six subscale HRQOL variables in this study, the findings may suggest that African American women ages 30 to 45 years with UF may place greater importance on how specific areas of their life are being impacted rather than on their overall quality of life in general.

Health related quality of life. Respondent’s perspective on HRQOL was specifically captured in hypotheses 7-12. The findings in this study, suggest that the respondents felt a negative impact on their health related quality of life due to their uterine fibroid symptoms a little of the time to some of the time. In research questions 7 – 9 there was a significant association with total HRQOL and symptom severity and employment history. The relationship is positive, indicating that as the severity of symptoms increases, the negative impact on HRQOL also increases. Therefore, the null hypotheses for questions 7-9 were rejected. This study finding supports current research which implies the greater the severity of symptoms experienced by women with UF, the more their total HRQOL will be negatively impacted (Borah et al., 2013; Spies et al., 2002; Vines, Ta, & Esserman, 2010). Given the significant association between symptom severity and the six subscale variables of HRQOL examined in this study the findings that respondents felt their HRQOL was impacted in some way appears to be consistent with current research findings. Researchers Brito et al. (2014) and Zimmeran et al. (2012) both found that women with UF reported their HRQOL to have been impacted negatively in multiple areas. It is important to note that this study findings suggest that African American women age 30 to 45 years with UF experience at least some significant negative influence on their health related quality of life based on the severity of UF symptoms and these findings remain consistent with current research literature.

The R^2 for the three models in research questions 7 – 9 ranged from 41.0% to 45.7%. The high R^2 indicate severity of symptoms and employment have a strong impact on the respondents’ health related quality of life. Current research also suggests that days missed at work and decreased work productively is higher among women with UF (Zimmerman et al., 2012). Cote, Jacobs, and Cummings (2002) estimated that costs associated with work loss from symptoms associated with UF are around $1,692 annually per woman. Downes et al. (2010) study findings demonstrated a loss in work productivity by 36% and 37.9% noted particularly in the general activity level for women with UF compared to women without UF in their study population. The results of this study indirectly lends support to the adaptation that non health factors among women with UF such as employment and the role it has on HRQOL is related. More importantly, the findings in this particular study suggest that more investigation as to the direct and in direct impact of work loss on HRQOL among women with UF should be further explored.

BMI and age did not significantly contribute to the models, suggesting that age nor BMI have a significant association with total HRQOL. However, this study did find a significant correlation of total HRQOL and symptom severity and BMI. The correlations of the total HRQOL summed score (DV) with symptom severity (IV), BMI (IV) and the covariates (age, relative, missed work) are displayed in Table 10. All the correlations of the IVs to the DV are significant indicating that symptom severity and BMI have a linear relationship with total HRQOL summed score. The literature reviewed found estrogen levels and elevated BMI among African American women, place them at increased risk for developing UF (Faerstein, Szklo, & Rosenshein, 2001; Flake, Andersen, & Dixon, 2003). The correlation of BMI, symptom severity and total HRQOL in this study provides support for the role that BMI may have in the increased development among African American women should be further examined.

For research questions 10 -12, there was no significant association of general health perception and HRQOL total score. Therefore, this study failed to reject the null hypotheses for questions 10 -12. Given the significant association between symptom severity and total HRQOL for this study, the findings general health perceptions and total HRQOL are not associated in this study is an interesting find. Since general health perceptions largely examines the respondents' view of their total health and is not specific to UF symptoms alone, it may suggest that general health perceptions is not a significant predictor for examining HRQOL among African American women with UF. While total HRQOL summed score was not significantly associated with general health perceptions, the two variables were significantly correlated in this study. General health perceptions (r = -.254, p = .023) as the DV and total HRQOL summed score as the IV has a linear relationship in this study (see Table 14). The negative correlation indicates higher total HRQOL summed score suggest an increased negative impact of uterine fibroids on the respondent's health related quality of life occurs as general health perceptions decreases. If a correlation between these two variables exists as suggested by this study findings, the connection can be vital for the research community and more investigation is warranted.

The literature reviewed for this study lacked empirical studies that examined all of the predictors of HRQOL in the manner that was attempted in this study. This study attempted toaddress that gap in the literature; some reliable measures of HRQOL were obtained in spite of the sampling's limitations. The findings in the current study demonstrate that symptom severity has a significant association with functional status and total HRQOL. More specifically, the findings of this study aided in determining how various elements in the participants' life (concern, energy/mood, activities, sexual function, self- conscious, concern, and employment history) were significantly associated with symptom severity. Conversely, in this study the following variables, symptom severity and total HRQOL are not significantly associated with general health perception, or overall quality of life even when controlling for covariates such as BMI, family hx of UF diagnosis, and age. Therefore, other variables that could be used to explore factors associated with HRQOL among African American women age 30 to 45 years with UF should be further explored.

Limitations of the Study

This was an exploratory non- experimental quantitative study design utilizing a survey instrument. The data were collected electronically. The population was identified because of their increased risk for UF development. The researcher attempted to broaden the sample by using three organizations (RGR, MRACDST, and SMLACDST) with a wide-ranging base of African American women. Several limitations were identified that could limit the generalizability of the findings. Overall, the limitations involve respondents characteristics/demographics, sample size, survey administration, and self-reporting of information.

The first limitation involved use of a convenience sample which included only African American women ages 30 to 45 years. The age inclusion for this study was specific to women who were ages 30 to 45 years because research has demonstrated this age range among African American women are at an increased risk for UF development. The average age was 39.2 years for the respondents of this study. Research has indicated that African American women are diagnosed at a higher rate and suffer more from UF when compared to women from other racial and ethnic backgrounds (Davis et al., 2009; ORWH, 2006; NIH, 2011; Wise et al., 2005b). Therefore, this study only included women who self-identified their race as being black or African American. According toTaran, Brown, & Stewart (2010) there has been limited reporting of the participants race and ethnicity within the studies associated with UF. Racial diversity in the sample population was lacking in that this researcher only sought to explore HRQOL factors among African American women only between the ages of 30 to 45 years to help fill that gap in literature. However, only having African American women between the ages of 30 to 45 years limited generalizability of this study findings to women from other racial and ethnic backgrounds and those outside of the specified age range.

The second limitation of the study was the small sample size. A total of 103 surveys were received. Twenty three were excluded from the study leaving a total of 80 who were included in the study. While the actual study sample size obtained for the study was sufficient enough to be adequately power the study, a larger sample size may have produced stronger statistically reliable results.

The third limitation of the study was that the survey was based online and only administered electronically. While electronic administration of the survey was more feasible and allowed participants to support this research anonymously, it also meant that only women who had access to a computer and the internet could respond to the survey. Therefore, economically or educationally advantaged African American women are more likely to have responded to the survey. Subsequently, the experiences of African American women with UF from lower socio-economic communities may be underrepresented in the study findings.

The fourth limitation was that participants self-reported personal health data such as history of UF diagnosis and no history of treatment for UF. In order to increase the likelihood of participants having a diagnosis of UF, they were asked if they had been informed by a health practitioner that they had a diagnosis of UF. Additionally, participants were asked to self-report information such as height, weight, race, and if they had received medical treatment for UF. There was lack of access to participants' medical records by the researcher in order to confirm height, weight, race, and treatment history of UF by the participants. Therefore, it is likely that some women with UF were excluded from the study because they have yet to seek medical attention or receive a preliminary diagnosis from a health practitioner which could have potentially increased the number of women eligible to participate in the study. In addition, the study findings are limited to those women with a first time diagnosis because a sub section of women with a second diagnosis of UF were excluded because they may have received treatment in the past but their UF have returned.

Recommendations

There is limited documentation on symptoms associated with UF and the impact of UF symptoms on HRQOL African American women ages 30 to 45 years. The results from this study added important information to the current knowledge base in this area. In addition, the results from this study provides valuable information on the symptoms and specific functional elements (concern, activities, energy/mood, self- conscious, sexual function, and control) that influence HRQOL among African American women ages 30 to 45 years that have been diagnosed with UF. More importantly, the findings from this study help promote the need for continued research that is patient centered and focused on African American women whose lives are more likely to be impacted negatively by UF.

The revised Wilson and Cleary revised model of HRQOL has been reviewed in depth in previous sections of this paper. No previous studies were found that used this conceptual framework to investigate the impact of symptom severity on HRQOL among African American women ages 30 to 45 years with UF. While this model was found to be effective in this study in exploring multiple factors that can influence HRQOL among women diagnosed with UF, each component of the model needs continued research to determine which factors can best influence HRQOL. The present study used the revised Wilson and Cleary model of HRQOL as the foundation to investigate the following factors: BMI, symptoms, functional status, overall quality of life, general health perception, characteristics of the individual, and characteristics of the environment among African American women age 30 to 45 years with a diagnosis of UF. Functional status, symptoms (severity), and employment history one of the characteristics of the environment were important and significant determinants of HRQOL. Because only these three model components were significant in the overall model, other variables which might explain HRQOL among women with UF need to be reviewed and examined. Subsequently, further studies using this model examining factors associated with UF and HRQOL are needed.

Employment history, as one of the two variables selected for characteristics of the environment in this study was found to have a significant association with HRQOL. Based on this finding, the impact UF symptoms has on job performance and potential work loss specifically among African American women with UF should continue to be examined. Age, as the only characteristics of the individual and BMI one of the two characteristics of the environment selected for this study were insignificant. The association of age and BMI with HRQOL among African American women with UF remains unclear. However, BMI was found to have a significant correlation with total HRQOL score. The finding that BMI is significantly correlated to the total HRQOL score suggests that additional investigation is warranted to determine a more specific correlation between BMI and health related quality of life among women with UF.

The convenience sample in this study was different from most of the literature in that it only included African American women ages 30 to 45 years, thus limiting the generalizability. African American women are likely to be diagnosed up to three times more when compared to their Euro American, Asian, and Hispanic counterparts (Moorehead and Conrad, 2001; NIH, 2011). Therefore, it was important to focus this research on the community of women likely to be impacted by UF at an increased rate when compared to their racial counterparts. Stakeholders may benefit from this study by understanding and identifying the specific areas in health and the daily lives of African

American women ages 30 to 45 years that are most affected by UF. More specifically, Women's health care professionals could more routinely incorporate communications related to the particular areas of HRQOL that may be impacted and identify some of the barriers to care that exist among African American women with UF. Additionally public health professionals could help with development of educational materials; thereby, playing a vital role towards ensuring current and relevant information is available to support delivery of sensitive and thoughtful care related to treatment of UF.

Implications for Social Change

Significant association between some of the predictor variables and symptom severity and total HRQOL was found in this study. Data on HRQOL associated with UF show that women with UF have significantly lower HRQOL scores when compared to those women without this condition (Pron et al., 2003; Spies et al., 2002). In order to provide sensitive patient centered care women's health care professionals need to have an understanding about the specific distresses that are experienced by women diagnosed with and suffering from UF. Researchers Harding et al. (2008) implied that more research that focuses on patient-reported outcomes about the problems and issues associated with UF symptoms are needed for the development of patient centered care options and to potentially improve patient outcomes. The rate at which African American women are diagnosed, the negative impact UF symptoms can have on HRQOL, and the burden of increased usage on healthcare systems for treatment of UF make this chronic and progressive health condition a growing public health concern (ORWH, 2006; NIH, 2011). This study's social change implication involves providing information that can stimulate health care providers in the development of health maintenance programs that are sensitive to the needs of African American women diagnosed with UF. Research suggests that African American women with UF are actively seeking out information related to UF symptoms and ways they can minimize those symptoms from impacting their lives (Ankem, 2007). Another social change implication for this study is that public health professionals and American medical organizations also can be motivated to increase the availability of information related to UF symptoms and the impact of UF symptoms on HRQOL. Thereby, supporting increased education and awareness about a chronic health condition that is likely to impact at least 1 in 3 African American women in their lifetime. These combined efforts can positively support the continued well-being of African American women diagnosed with UF and encourage more dialogue to help minimize the current culture of suffering in silence (Cambridge & Sealy, 2012) noted among African American women diagnosed.

Summary

Uterine fibroids are a medical condition with wide spread symptoms that occur among women of all races. According to the Office of Research on Women's Health (2006) approximately one quarter of all women in the United States of reproductive age have symptomatic UF. African American women however, are diagnosed up to three to nine times more often when compared to Caucasian women (NIH, 2011). In addition, there is a higher prevalence among African American women of child bearing age compared with women of other races (Davis et al., 2009; Wise et al., 2005b). Research has identified that UF symptoms and the problems associated with UF symptoms can affect the HRQOL among women diagnosed. Often times women who are diagnosed with UF that experience prominent symptoms seek treatment because of the difficulty they encounter with managing the symptoms effectively and the negative burden UF symptoms can have on HRQOL.

Currently, much of the research related to UF is centered on identifying the most efficacious medical treatment options for removal of UF that would decrease the extended time of recovery and still allow women of childbearing age the option to keep their uterus intact supporting improved quality of life. This study attempted to obtain empirical evidence from an existing population of African American women ages 30 to 45 diagnosed with UF regarding the symptoms associated with UF and the impact of UF symptoms on their HRQOL. Participants reported a significant association with symptom severity and total health related quality of life and symptom severity and all of the health related quality of life subscale variables or functional status. More specifically participants noted at least some to a little distress in the areas of concern, activities, energy/mood, self- conscious, sexual function, and control as it’s related to the symptoms associated with UF. Participants also reported that symptom severity did negatively impact their employment leading to days missed from work. General health perception, overall quality of life, BMI, age, nor family hx of UF diagnosis did not show a significant relationship with HRQOL.

Uterine fibroids is a chronic condition, which can be debilitating to the health and lives of women who experience severe symptoms. African American women who have been diagnosed with UF face a myriad of issues related symptom management, treatment options, increased financial burden, and interruption in their daily lives. Aiding African American women and health professionals understanding of the problems associated with UF symptoms and how they influence HRQOL can impact decisions related to treatment options and how to better manage symptom. For that reason, continued exploration into the personal health factors associated with UF and their specific impact on HRQOL is warranted to further highlight factors that can influence HRQOL. Therefore, future research particularly on the effects of factors that are related to UF symptoms impact on HRQOL is recommended to support an enhanced personal sense of well-being for African American women diagnosed.

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Appendix A: Consent Form

You are invited to participate in a research study of health related quality of life in African American women. You have been selected as a possible participant because you identify yourself as African American, female, current diagnosis of UF and between the ages of 30-45 years. Please read this form. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This study is being conducted by: Ilisher Ford, doctoral candidate at Walden University.

Background Information:
The purpose of this study is to explore symptom severity associated with uterine fibroids and the impact of UF symptoms on health related quality of life. Participants in this study will represent African American women ranging in age from 30-45 with a current diagnosis of UF and have not received any surgical treatment for uterine fibroids. The participants in this study will be members of a community service organization and a running group for women. The findings of this study will assist the Public Health community in effectively exploring the factors that are associated with uterine fibroids among African American women.

Procedures:
If you agree to participate in this study, you will be asked to do the following things: Review this consent form, complete a 37 item questionnaire, and complete a form with background information about you.

Voluntary Nature of the Study:
PLEASE NOTE: You have the freedom to decide not to participate in this study. Your participation in this study is strictly voluntary. Your decision whether or not to participate will not affect your current or future relations with the researcher or your organizational affiliation. If you initially decide to participate, you are still free to withdraw at any time later, without affecting those relationships.

Risks and Benefits of Participation:
Being in this type of study involves some risk of the minor discomforts that can be encountered in daily life, such as fatigue, stress or becoming upset. Being in this study would not pose risk to your safety or wellbeing.

PLEASE NOTE: in the event you experience stress or anxiety during your participation in the study, you may terminate your participation at any time. You may refuse to answer any questions you consider invasive or stressful. You may also seek additional counsel with Cobb and Douglas Community Services Boards, **call ________** or Dekalb

Community Services Board, **call __________, should you feel any anxiety or stress as a result of your participation in this study.**

Compensation:
There is no compensation to be gained from participation in this study.

Confidentiality:
The records of this study will be kept private. In any report of this study that might be published, the researcher will not include any information that will make it possible to identify you as a participant. Research records will be kept in a locked file; only the researcher will have access to the records.

Contacts and Questions:
The researcher conducting this study is Ilisher Ford. The researcher's adviser is **Dr. Precilla L. Belin, PhD, MA, CHES.** You may ask any questions you have now. If you have questions later, you may contact her **at ____________**. The Research Participant Advocate at Walden University is __________; you may contact her **at ___________**, if you have questions about your participation in this study. Walden University's approval number for this study is **________** and it expires on ___________.

Thank you for participating! Please print or save this consent form for your records.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By clicking the identified link, I understand that I am agreeing to the terms described above.

Appendix B: Screening Information

Instructions: PLEASE READ CAREFULLY
This section asks four questions that may or may not describe some general characteristics about you. The information obtained from this form will be kept private and confidential. PLEASE DO NOT LIST ANY NAMES OR INCLUDE ANY PERSONAL IDENTIFYING INFORMATION WHEN COMPLETING THIS FORM.

Direction: Please select the one response that best fits your current status.

1. Do you identify yourself as Black/African American? YES or NO

2. Have you ever been informed by a medical healthcare practitioner (Medical Doctor, Nurse Practitioner, Physician Assistant) that you have a diagnosis of Uterine Fibroids? YES or NO

3. Are you currently between the age of 30 to 45 years? YES or NO

If you responded NO, to any one of the three questions above, please STOP here and do not proceed forth with completion of the survey.

If you responded YES to all three of the questions above please proceed forth to the next question.

4. Have you ever received medical treatment in the form of Uterine Fibroid Embolization, Myomectomy, or Hysterectomy for your Uterine Fibroids? YES or NO

If you responded YES to the question above, please STOP here and do not proceed forth with completion of the survey. If you responded NO, to the question above, please proceed forth to the next section.

Thank you for your time and willingness to support this research project.

Appendix C: Demographic Information Form

Instructions: PLEASE READ CAREFULLY
This section asks questions that describe some general characteristics about you and your family. This information helps us to understand general characteristics of the people who have completed this survey. The information obtained from this form will be kept private and confidential. PLEASE DO NOT LIST ANY NAMES OR INCLUDE ANY PERSONAL IDENTIFYING INFORMATION WHEN COMPLETING THIS FORM.

Direction: Please fill in the blank or select the response that best fits your current status

1) How old are you?
Age: __________ in years

2) What is your current height? ________ Feet ______ Inch(es)

3) What is your current weight? ______lbs

4) Have you ever missed days or time off work as a direct result of the symptoms you have experienced from Uterine Fibroids?

Yes _____
No _____
I do not know ______

5) Has anyone in your immediate (e.g. mother, sister, grandmother, aunt) family ever been diagnosed with UTERINE FIBROIDS?

Yes _____
No ______
I do not know ______

6) If your response to question five (5) is YES, please select all that apply.

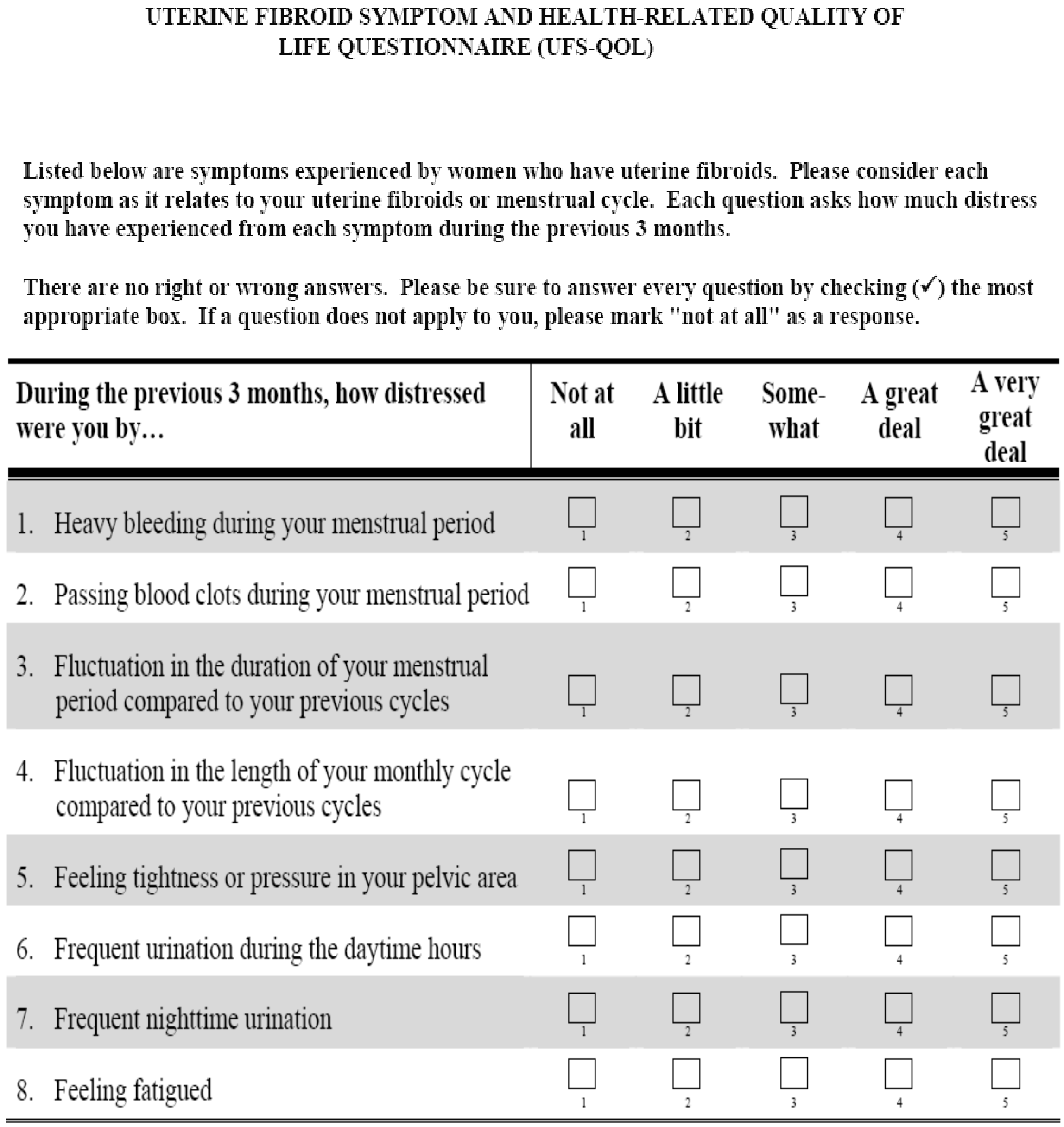
Mother _____
Aunt _______
Grandmother ______
Sister _______
I do not know ______
Not Applicable ______

7) How would you rate your current health on a scale from 1 to 10 (with 1= poor and 10 = excellent)? ________

8) How satisfied are you with your overall life in general on a scale from 1 to 10 (with 1 = poorly satisfied and 10 = very satisfied)? __________

Appendix D: Survey Instrument

Please do not include your name or
any personal identifiers on this form.



UTERINE FIBROID SYMPTOM AND HEALTH-RELATED QUALITY OF LIFE QUESTIONNAIRE (UFS-QOL)

Listed below are symptoms experienced by women who have uterine fibroids. Please consider each symptom as it relates to your uterine fibroids or menstrual cycle. Each question asks how much distress you have experienced from each symptom during the previous 3 months.

There are no right or wrong answers. Please be sure to answer every question by checking (✓) the most appropriate box. If a question does not apply to you, please mark "not at all" as a response.

During the previous 3 months, how distressed were you by…	**Not at all**	**A little bit**	**Some-what**	**A great deal**	**A very great deal**
1. Heavy bleeding during your menstrual period	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
2. Passing blood clots during your menstrual period	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
3. Fluctuation in the duration of your menstrual period compared to your previous cycles	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
4. Fluctuation in the length of your monthly cycle compared to your previous cycles	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
5. Feeling tightness or pressure in your pelvic area	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
6. Frequent urination during the daytime hours	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
7. Frequent nighttime urination	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
8. Feeling fatigued	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

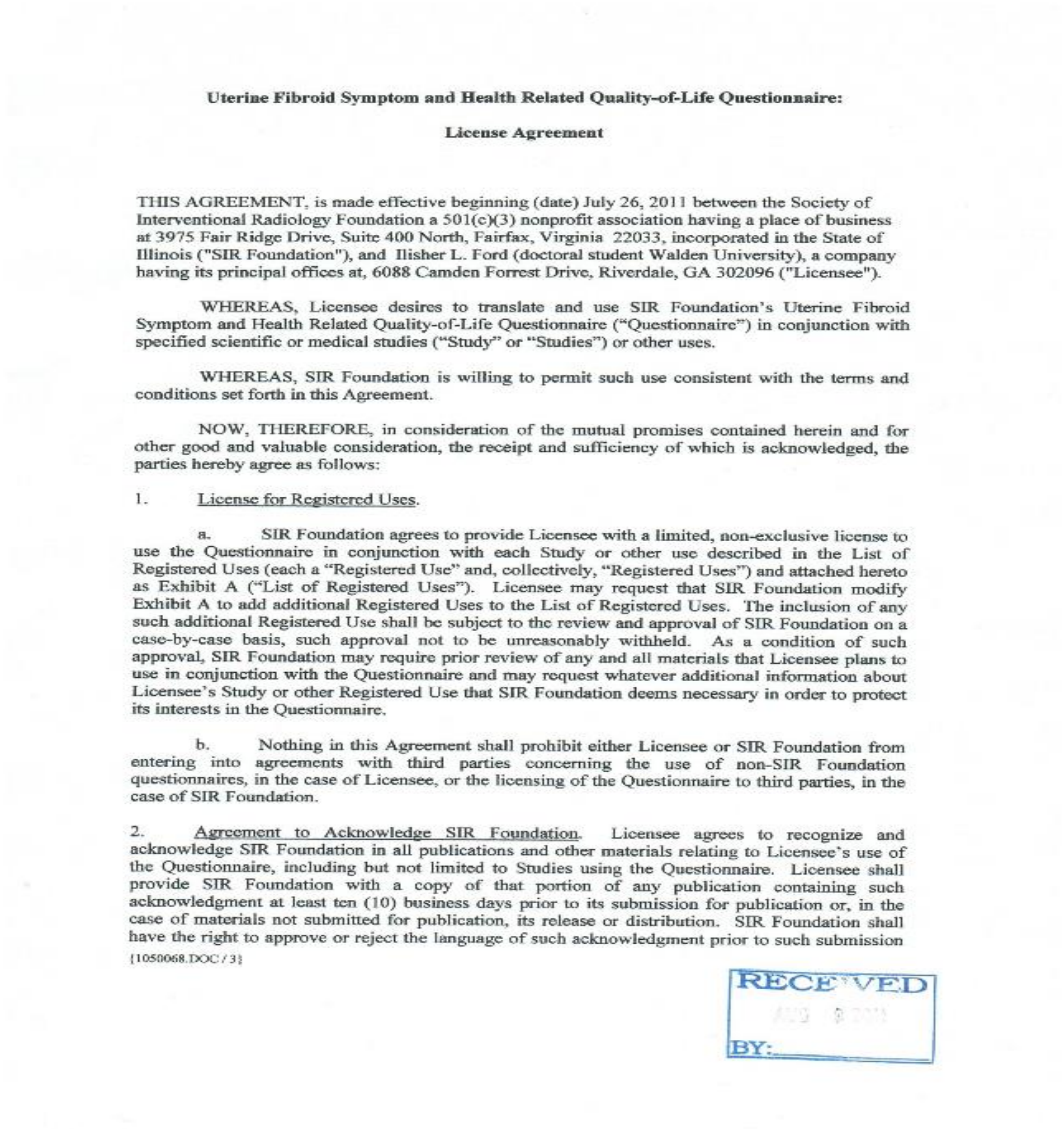
The following questions ask about your feelings and experiences regarding the impact of uterine fibroid symptoms on your life. Please consider each question as it relates to your experiences with uterine fibroids during the previous 3 months.

There are no right or wrong answers. Please be sure to answer every question by checking (✓) the most appropriate box. If the question does not apply to you, please check "none of the time" as your option.

During the previous 3 months, how often have your symptoms related to uterine fibroids...	None of the time	A little of the time	Some of the time	Most of the time	All of the time
9. Made you feel anxious about the unpredictable onset or duration of your periods?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
10. Made you anxious about traveling?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
11. Interfered with your physical activities?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
12. Caused you to feel tired or worn out?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
13. Made you decrease the amount of time you spent on exercise or other physical activities?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
14. Made you feel as if you are not in control of your life?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
15. Made you concerned about soiling underclothes?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
16. Made you feel less productive?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
17. Caused you to feel drowsy or sleepy during the day?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
18. Made you feel self-conscious of weight gain?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
19. Made you feel that it was difficult to carry out your usual activities?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
20. Interfered with your social activities?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
21. Made you feel conscious about the size and appearance of your stomach?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
22. Made you concerned about soiling bed linen?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

During the previous 3 months, how often have your symptoms related to uterine fibroids...	**None of the time**	**A little of the time**	**Some of the time**	**Most of the time**	**All of the time**
23. Made you feel sad, discouraged, or hopeless?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
24. Made you feel down hearted and blue?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
25. Made you feel wiped out?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
26. Caused you to be concerned or worried about your health?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
27. Caused you to plan activities more carefully?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
28. Made you feel inconvenienced about always carrying extra pads, tampons, and clothing to avoid accidents?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
29. Caused you embarrassment?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
30. Made you feel uncertain about your future?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
31. Made you feel irritable?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
32. Made you concerned about soiling outer clothes?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
33. Affected the size of clothing you wear during your periods?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
34. Made you feel that you are not in control of your health?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
35. Made you feel weak as if energy was drained from your body?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
36. Diminished your sexual desire?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
37. Caused you to avoid sexual relations?	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Appendix E: Research Survey Instrument Permission Document



Uterine Fibroid Symptom and Health Related Quality-of-Life Questionnaire:

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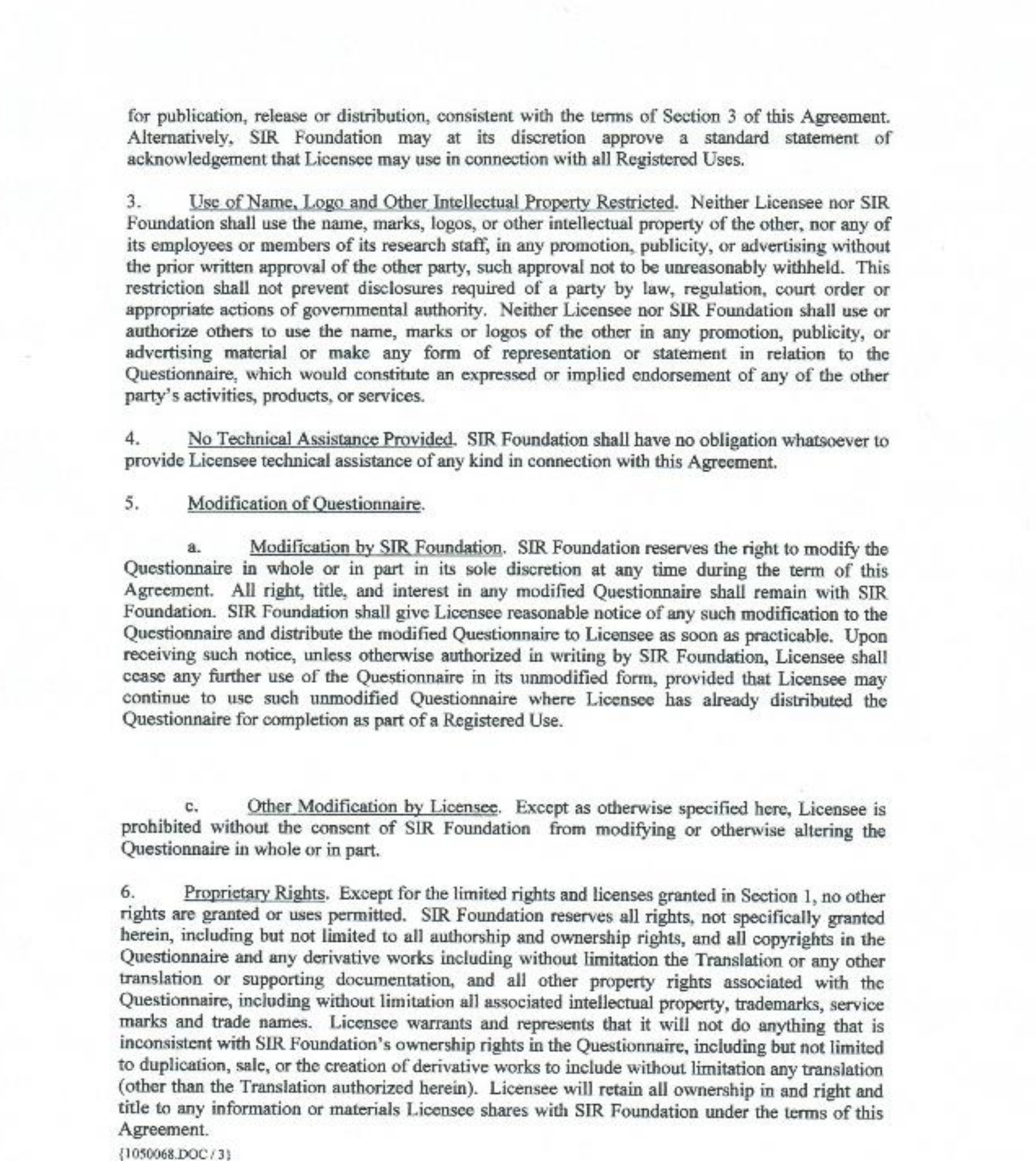

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10. Limitation of Liability; Indemnification.

a. SIR Foundation, its officers, directors and employees shall indemnify and hold harmless Licensee, its officers, directors, members and employees, from any and all claims, demands, suits, costs, or expenses (including reasonable attorneys' fees) of whatever nature and description arising out of or related in any way to an authorized use of the Questionnaire by Licensee, its employees, agents or subcontractors, or the non-negligent performance of Licensee's obligations under this Agreement where such claims allege that use of the Questionnaire infringes or misappropriates the copyright or other intellectual property rights of any third party or where such claims arise out of SIR Foundation's breach of its warranties and representations hereunder as set forth in Section 7; provided that SIR Foundation will not be responsible for any claims arising out of any modifications made to the Questionnaire by Licensee, including without limitation the translation of the Questionnaire. Licensee shall provide SIR Foundation with prompt notice of any such claim and SIR Foundation shall have the authority to defend or settle any such claim subject to approval by Licensee which shall not be unreasonably withheld. Licensee shall cooperate with SIR Foundation in defense of any such claim, and shall not compromise or otherwise settle any such claim without SIR Foundation's prior written consent. SIR Foundation shall not be liable for any direct, indirect, special, incidental or consequential loss or damage of any kind, including lost profits (whether or not the parties have been advised of such loss or damage) arising in any way in connection with Licensee's use of the Questionnaire.

b. Licensee, its officers, directors and employees shall indemnify and hold harmless SIR Foundation, its officers, directors, members and employees, from any and all claims, demands, suits, costs, or expenses (including reasonable attorneys' fees) of whatever nature and description arising out of or related in any way to any translation or use of the Questionnaire by Licensee, its employees, agents or subcontractors, or the performance of its obligations in breach of this Agreement (except for claims alleging that use of the Questionnaire infringes the copyright or other intellectual property right of any third party or where such claims arise out of SIR Foundation's breach of its warranties and representations hereunder, or other fault of SIR Foundation). SIR Foundation shall provide Licensee with prompt notice of any such claim and Licensee shall have the authority to defend or settle any such claim subject to approval by SIR Foundation, which shall not be unreasonably withheld. SIR Foundation shall cooperate with Licensee in defense of any such claim, and shall not compromise or otherwise settle any such claim without Licensee's prior written consent. Licensee shall not be liable to SIR Foundation for any direct, indirect, special, incidental or consequential loss or damage of any kind, including lost profits (whether or not the parties have been advised of such loss or damage) arising in any way in connection with Licensee's use of the Questionnaire.

c. Licensee shall include a disclaimer and statement of limited liability, acceptable to SIR Foundation, in all materials incorporating the Questionnaire, including but not limited to the Translation and all materials issued in conjunction with Licensee's Study or other Registered Use. The disclaimer and statement of limited liability shall indicate that the decision to use the Questionnaire is made at Licensee's independent election and that Licensee is solely responsible for the administration of the Questionnaire and any related findings, conclusions or recommendations.

11. Term of Agreement; Termination. This Agreement shall commence on the effective date above and will continue in force for a period that is coterminous with the term of the applicable Registered Use. Either party may terminate this Agreement upon thirty (30) days prior written notice to the other party if the other party commits a material breach of this Agreement and fails to cure that breach within thirty (30) days notice of such material breach. For the purposes of this section, a material breach by Licensee includes but is not limited to: (1) any unauthorized translation or non-registered use or distribution of the Questionnaire; (2) unauthorized use or misuse of SIR Foundation's name or marks including but not limited to unauthorized promotion or publicity; (3) failure to make royalty payments due to SIR Foundation as required under this Agreement; (4) material changes in the scope of a Registered Use unless expressly approved in writing by SIR Foundation; or (5) a judicial or administrative finding that Licensee or one of Licensee's affiliates has engaged in unlawful or unethical conduct of such a nature that SIR Foundation reasonably determines that Licensee's continued use of the Questionnaire would adversely affect the goodwill and reputation of SIR Foundation or its affiliates.

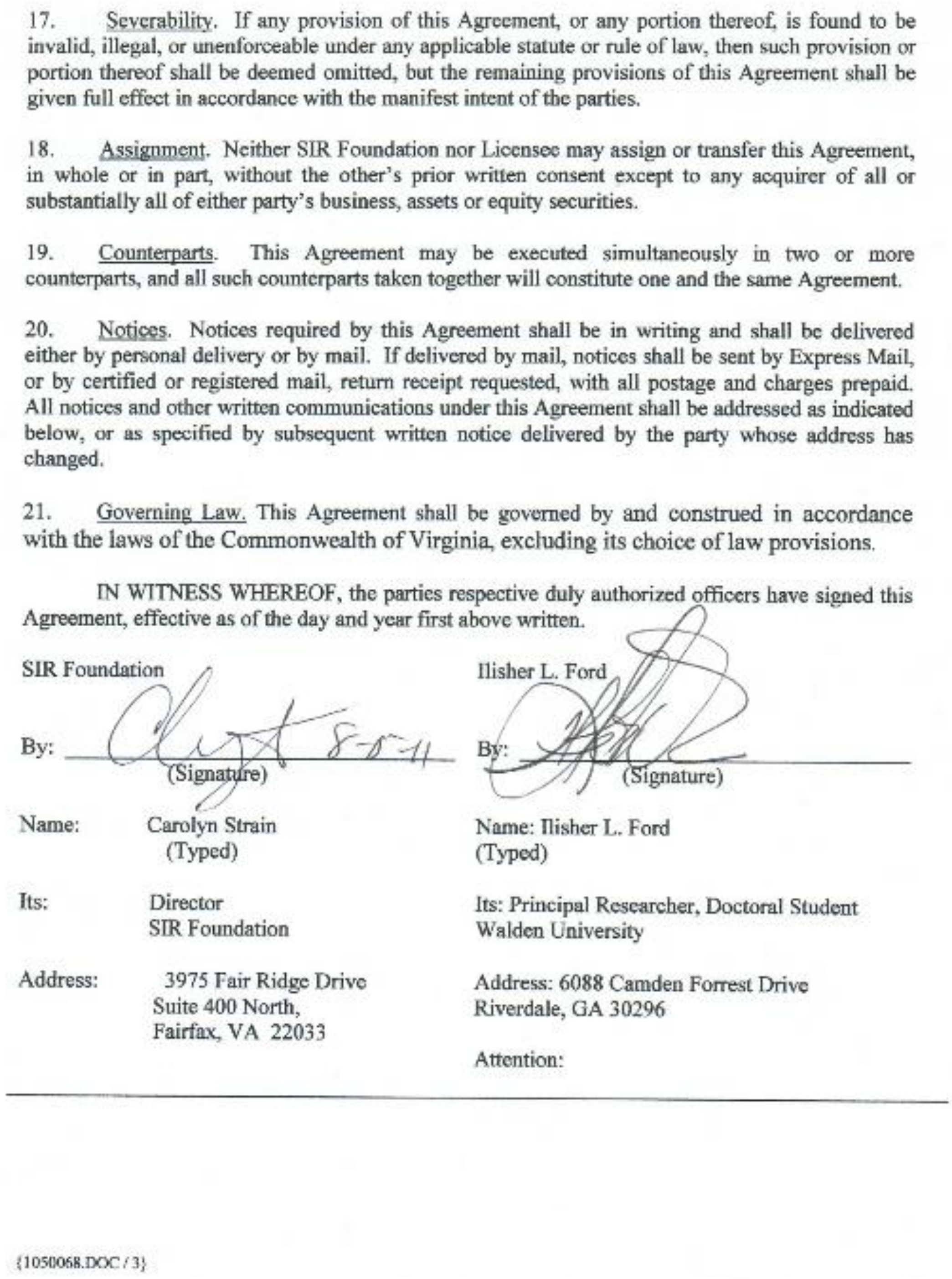
12. Effect of Termination, Expiration, or Modifications. Upon expiration or termination of this Agreement, unless otherwise authorized by SIR Foundation, Licensee shall cease immediately all use of this Questionnaire or any translation of the Questionnaire.

13. Waiver. Either party's waiver of, or failure to exercise, any right provided for in this Agreement shall not be deemed a waiver of any further or future right under this Agreement.

14. Successors and Assigns; No Third Party Beneficiaries. This Agreement shall be binding on the parties, and on their successors and assigns, without regard to whether it is expressly acknowledged in any instrument of succession or assignment. The Agreement is not intended to benefit or create any enforceable rights in any third parties.

15. Headings. The headings of each paragraph of this Agreement are inserted solely for the reader's convenience, and are not to be construed as part of the Agreement.

16. Entire Agreement; Amendment. This Agreement, and the Exhibits attached hereto, constitutes the entire agreement between the parties, and supersedes all prior writings or oral agreements. This Agreement may be amended only by a writing clearly setting forth the amendments and signed by the party against whom enforcement is sought. Exhibit A may be amended in writing by mutual agreement of SIR Foundation and Licensee to incorporate additional Registered Uses as described in this Agreement.



17. Severability. If any provision of this Agreement, or any portion thereof, is found to be invalid, illegal, or unenforceable under any applicable statute or rule of law, then such provision or portion thereof shall be deemed omitted, but the remaining provisions of this Agreement shall be given full effect in accordance with the manifest intent of the parties.

18. Assignment. Neither SIR Foundation nor Licensee may assign or transfer this Agreement, in whole or in part, without the other's prior written consent except to any acquirer of all or substantially all of either party's business, assets or equity securities.

19. Counterparts. This Agreement may be executed simultaneously in two or more counterparts, and all such counterparts taken together will constitute one and the same Agreement.

20. Notices. Notices required by this Agreement shall be in writing and shall be delivered either by personal delivery or by mail. If delivered by mail, notices shall be sent by Express Mail, or by certified or registered mail, return receipt requested, with all postage and charges prepaid. All notices and other written communications under this Agreement shall be addressed as indicated below, or as specified by subsequent written notice delivered by the party whose address has changed.

21. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Virginia, excluding its choice of law provisions.

IN WITNESS WHEREOF, the parties respective duly authorized officers have signed this Agreement, effective as of the day and year first above written.

SIR Foundation	Ilisher L. Ford
By: 8-5-11 (Signature)	By: (Signature)
Name: Carolyn Strain (Typed)	Name: Ilisher L. Ford (Typed)
Its: Director SIR Foundation	Its: Principal Researcher, Doctoral Student Walden University
Address: 3975 Fair Ridge Drive Suite 400 North, Fairfax, VA 22033	Address: 6088 Camden Forrest Drive Riverdale, GA 30296
	Attention:

Appendix F: Homogeneity of Variance Assumption Tests, Research Questions 1 Through 6

Figures used to test the homogeneity of variance assumption. Research Question 1 through Research Question 6.

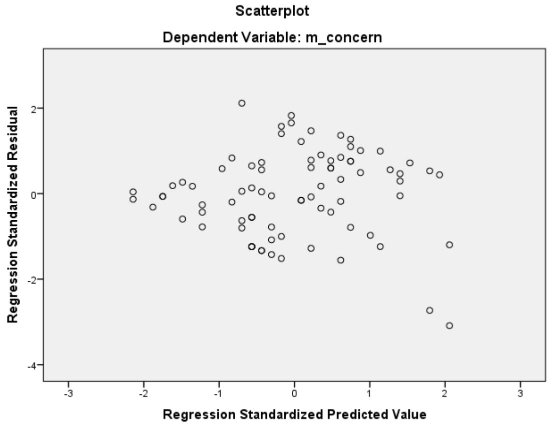


Figure F1. RQ1 - concern

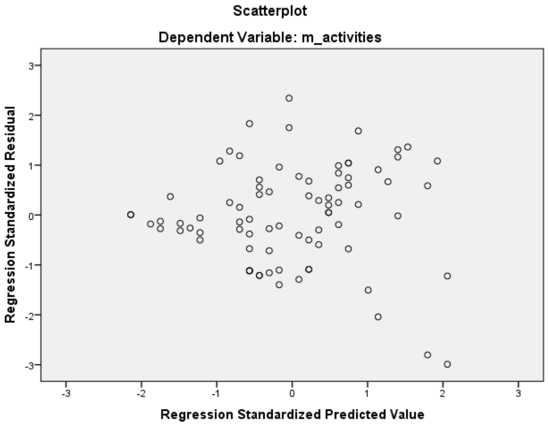


Figure F2. RQ2 activities

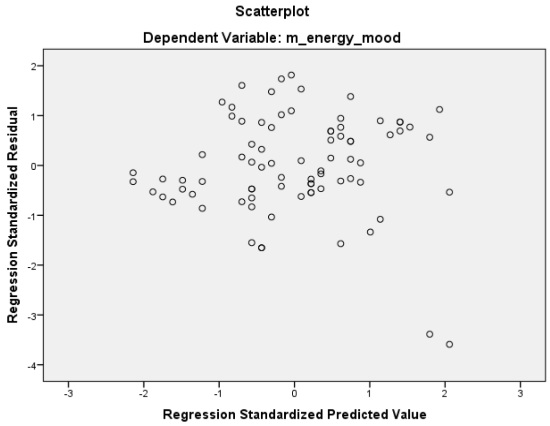


Figure F3. RQ3 - energy/mood

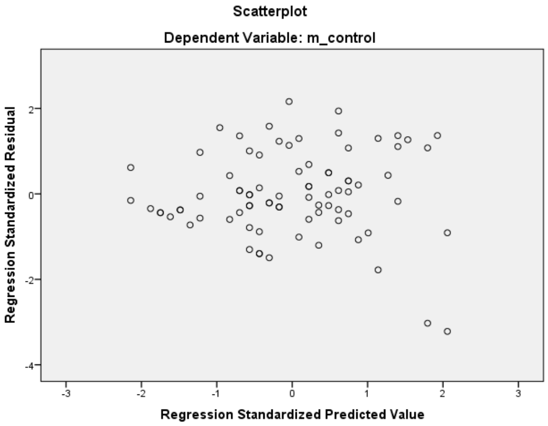


Figure F4. RQ4 control

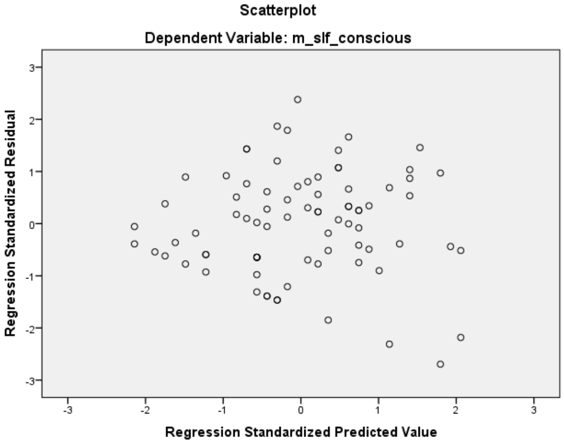


Figure F5. RQ5 - self-consciousness

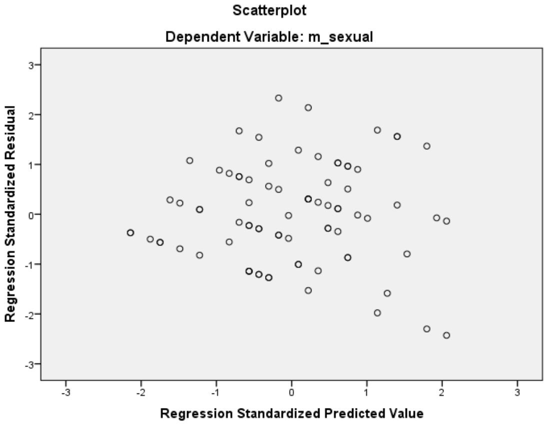


Figure F6. RQ6 sexual function

Appendix G: Homogeneity of Variance Assumption Tests, Research Questions 7 Through 9

Figures used to test the homogeneity of variance assumption.
Research Question 7 through Research Question 9

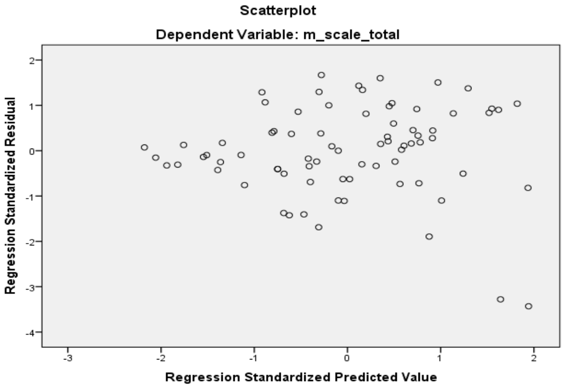


Figure G7. RQ7 - IVs = severity, BMI

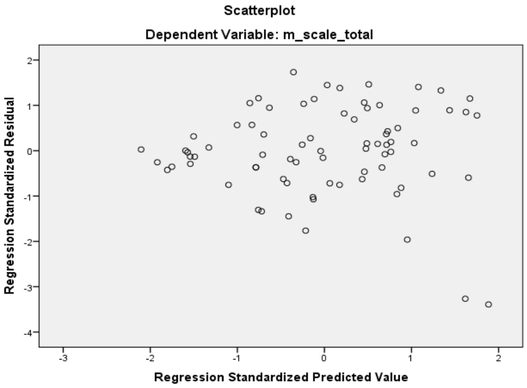


Figure G8. RQ8 - IVs = severity, BMI, age

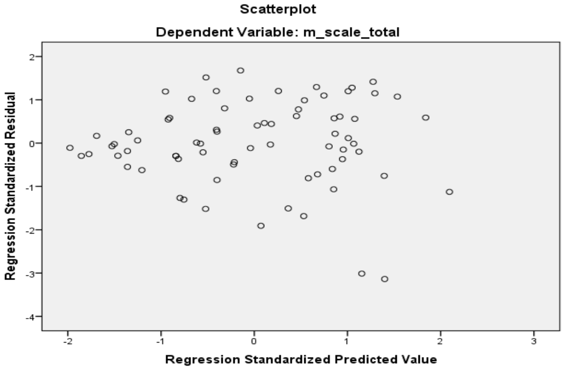
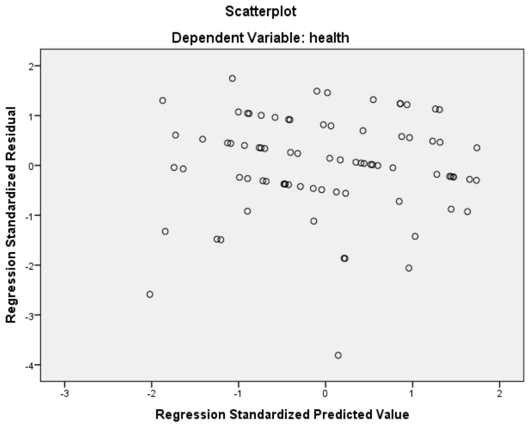


Figure G9. RQ9 - IVs = severity, BMI, employment history, family history

Appendix H: Homogeneity of Variance Assumption Tests, Research Questions 10 Through 12

Figures used to test the homogeneity of variance assumption.
Research Question 10 through Research Question 13.



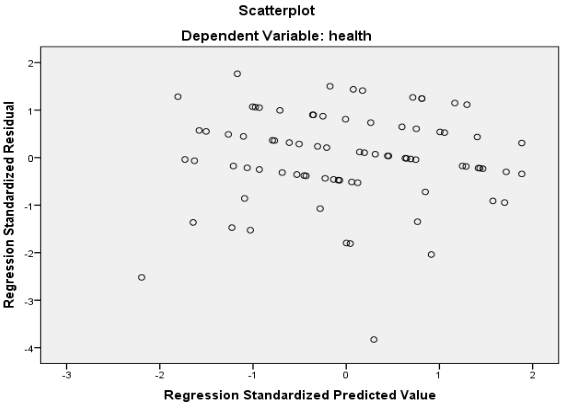
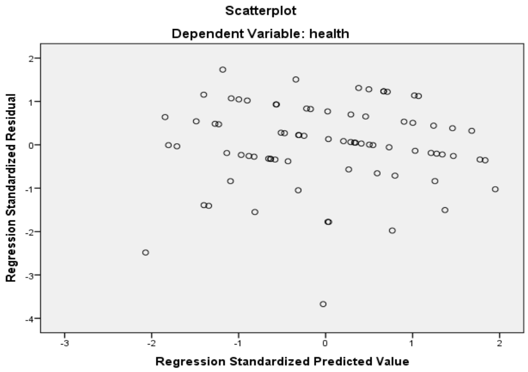


Figure H10. RQ11 - IVs = severity, HRQOL total score

Figure H11. RQ11 - IVs = severity, HRQOL total score, age



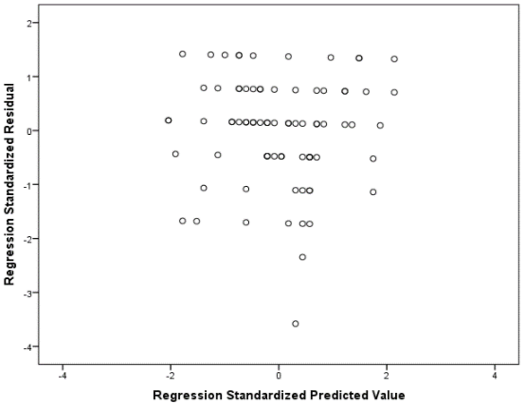


Figure H12. RQ12 - IVs = severity, HRQOL total score, employment history, family history

Figure I13. Scatterplot to test homogeneity of variance for RQ13.

Curriculum Vitae

Ilisher L. Ford

CURRICULUM VITAE

EDUCATION:

September 28, 2015 (Successful Defense)	Walden University, Minn, MN Degree: Doctorate of Public Health Candidate Concentration: Community Education and Health Promotions

***Dissertation: Uterine Fibroid Symptom Severity and Impact on Health Related Quality of Life Among African American Women**

November 2006	Walden University, Minn, MN Degree: Master of Science Public Health Concentration: Community Education and Health Promotions
May 1996	Clark Atlanta University, Atlanta, GA Degree: Master of Social Work Concentration: Health/Mental Health

***Thesis: A Descriptive Study Examining the Relationship Between Stress and Risk-Taking Behavior Among Academically Successful African American Women**

May 1993	Hampton University, Hampton, VA Degree: Bachelor of Arts Concentration: Psychology

LICENSURE:

Licensed Master of Social Work	Issuing State: Georgia	Expiration Date: 09/2016

EXPERIENCE:

05/2012 to present **Kaiser Permanente, Atlanta, GA**
Acute Care Case Manager
Acute Care and Clinical Decision Unit

- Research, analyze and investigate members healthcare plan benefits for close coordination of services
- Research, collect and summarize clinical and medical data on members health plans usage
- Analyze care plans to ensure rational and strategic use of health plan resources are maintained
- Conduct telephonic follow up and evaluate members needs for population based health services.
- Physician documentation and coaching
- Build partnerships and work collaboratively with key health plan partners to improve health service delivery
- Ensure timely linkage to strategic internal and external community partners to support the organizations business goals.
- Track, identify, and report information/data which present barriers towards achieving healthcare goals
- Serve as a liaison for patients/family members and health team members
- Consult and collaborate with multidisciplinary/cross functional healthcare teams
- Pilot project participant for the development of Transitional Care Management and Post Hospital Discharge

05/ 2002 to 05/2012 **Piedmont Hospital**
Patient Care Coordinator
Piedmont Health System, Atlanta, GA

- Strategizing with healthcare team to assess needs and develop individualized health care treatment objectives
- Gather and analyze information to identify needs and solutions for the delivery of population based health services.
- Perform utilization review task, analyze, and manage health benefits to support organizational strategic financial objectives
- Provide health education, disease awareness, and crisis intervention to support positive population based outcomes
- Collaborate and work in partnership with other health disciplines to facilitate disease management services
- Research , evaluate and summarize community resource programmatic services
- Work collaboratively with key community partners to ensure timely and seamless delivery of services
- Provide written and oral report of research results and evaluation activities to appropriate stakeholders
- Surveillance and provide written documentation of departmental variances, quality, cost and risk issues
- Develop and implement patient population interventions
- Provide training and supervision to new employees on departmental and hospital protocol
- Pilot program member for the development of the Geriatric OASIS Program

2010 to Present **Strayer University**
Adjunct Faculty Instructor

- Serve as faculty instructor to students enrolled in courses of Health Management and Health Information Management
- Support student growth with timey written weekly feedback
- Provide instructional feedback to student on line postings at least 5 days a week
- Evaluate student papers, quizzes, final exam and weekly written assignments
- Ensure that students are adhering to University policy and procedures
- Delivers clear and effective communications in order to facilitate classroom discussion electronically on course content related to principles of Health Information Management as outlined in the course syllabus

2008 to Present **DeVry University**
Adjunct Faculty Instructor

- Serve a faculty instructor to students enrolled in introductory courses to Psychology
- Delivers clear and effective communications in order to facilitate classroom discussion electronically on course content related to principles of Psychology and Health as outlined in the course syllabus
- Facilitate and oversee administration of weekly quizzes; application assignments and course final exam
- Support student growth with written weekly feedback regarding their progress throughout the

course
- Provide instructional, timely, and written feedback to students weekly
- Ensure that students are adhering to University policy and procedures

2007 to Present **University of Phoenix**
Adjunct Faculty Instructor

- Serve as faculty instructor to students enrolled in courses of Human Service and Personal Health Management
- Support student growth with written weekly feedback regarding their progress throughout the course
- Offer guidance and /or commentary to student inquires within 24 hours
- Provide instructional feedback to student on line postings at least 5 days a week
- Evaluate student papers, quizzes, final exam and weekly written assignments
- Ensure that students are adhering to University policy and procedures
- Facilitate classroom discussions online regarding subject content related to principles of Human Service and/or Personal Health Management as outlined in the course syllabus
- Hold office hours 5 days per week for student advisement and course instruction

02/1997 to 05/2002 **Medical Social Worker/Disposition Planner**
Wellstar Douglas Hospital
Wellstar Health System, Marietta, GA

- Provided psychosocial assessments, individual/family & bereavement counseling; crisis intervention, development and implementation of disposition plans for patients referred to the Social services department.
- Team Collaboration: Worked in partnership with other health care team member, health disciplines, and community agencies to develop patient care plans.
- Engaged the patients and patient family in the development of disposition plans.
- Provided health education to patients and family members
- Coordinated community resources, referral services and/or related services throughout the continuum of care.
- Monitored current community resources and programs, including investigating eligibility criteria and service availability. Worked in partnership with community agencies in order to assist patients' with needs beyond disposition.
- Provided training and supervision to new employees on departmental and hospital protocol.
- Served as a Field Instructor and supervisor to MSW and BSW student interns.

PUBLICATIONS:

Tucker, D., Bechtel G., Quartana, C., Badger, N., Werner, D., Ford, I., & Connelly, L. (2006). The OASIS program: Redesigning Hospital Care for Older Adults. Geriatric Nursing, 27(2), 112-117

PRESENTATIONS/SEMINARS:

11/20/12: NCBW NWGA Chapter POWER Program presenter-
“Uncork the Truth” World AIDS Day, Atlanta Georgia
11/01/11: Presenter Social Inequality: Disparities in Healthcare,
Morehouse College, Atlanta, Georgia
03/20/10: Presenter- “It’s Never too Late Abuse Symposium”, Atlanta Georgia
02/29/06: Seminar Facilitator “Basic HIV/AIDS Education”
Roberts School of Cosmetology, Atlanta, Georgia

05/29/05:	Seminar Facilitator “Identifying Personality Traits to Maximize Performance” Roberts School of Cosmetology, Atlanta, Georgia
AWARDS:	2007 Montague Boyd Award , “Best Special Outcomes” Article

PROFESSIONAL AFFILIATIONS:

1995 to present	Marietta Roswell Alumnae Chapter, Delta Sigma Theta Sorority, Inc.
2012 to present	National Coalition 100 Black Women, Northwest Georgia Chapter
2012 to present	The White Dress Project

COMMUNITY SERVICE AND VOLUNTEERISM:

October 2011, 2012	Healthy Moves Initiative, Health Expo Committee Project Lead
August 2011	New Beginnings Today Wellness Center, Planning Committee Lead, Back to School Health Fair
February 2011	Elizabeth Baptist Church Health Committee, Volunteer Health Educator:
October 2010	Heart Disease and Stroke Education/ Awareness Initiative HIV/AIDS Education/Awareness Initiative
September 2009, 2010	CHAMPS Health Fair Volunteer,
2008 to 2009	CARE Inc.- Advocacy Volunteer District Lead
March 2009, 2008	Marietta Roswell Alumnae Chapter, Delta Sigma Theta Sorority, Inc. Physical and Mental Health Committee Volunteer Marketing and Promotions Team: WiiFit Community Health Fair Everybody Move Community Health Fair