HPV Knowledge and Cervical Cancer Prevention in Women

A Thesis

Submitted to the Faculty

of

Drexel University

by

Kymberlee A. Montgomery

in partial fulfillment of the

requirements for the degree

of

Doctor of Nursing Practice

April 2009
Dedications

To my husband Owen and my two sons Richie and Ryan, there are no words to express the depth and breadth of my appreciation for your unwavering love and support during this amazing journey.

Owen, without you... I would never have contemplated such an undertaking. Without you...I would never have had the stamina to persevere. Without you...I would have never experienced the sheer joy of completing this doctoral degree. Step by step you have walked through this journey with me. You are my rock and the love of my life!

Richie and Ryan, you both have inspired me to reach for heights that I never imagined possible. You gave and sacrificed so much to support me in this endeavor. With every breath I take, I strive to be a positive role model and force in your life. Find your passion....believe in yourself....and you can achieve anything. I am always here for you. I love you more than you could ever know!
Acknowledgements

“You must be the change you wish to see in the world.”
— Mahandas K. Gandhi

I am extremely grateful to so many individuals for giving up their valuable time and energy to assist me on my personal and professional metamorphosis from a seasoned nurse practitioner to a fully realized nurse educator, an expert clinician, and a nascent researcher…. a Doctor of Nursing Practice (DrNP).

First and foremost, I would like to thank my DrNP Program Director, Dr. H. Michael Dreher. His passionate commitment and dedication to the nursing profession, along with his innovative program design and determination has inspired me to complete the doctoral program and has empowered me to “be my own change”.

I would like to acknowledge my dissertation committee members and express my sincere appreciation for their hard work and support throughout this amazing journey. Special thanks to my committee chair, Dr. Joan Rosen Bloch. I would have never dreamed that the initial phone call from Dr. Bloch to bond nurse practitioners together to improve communication and patient care within the women’s health community would have lead me down the path to doctoral study and ultimately to the achievement of a myriad of lifetime career goals. Dr. Bloch has challenged me in ways that I never imagined possible and I will be
eternally thankful. I would like to extend my deepest appreciation to Dr. Robert Goldenberg and Dr. Maryellen Glasgow for their support and dedication to my work and to my success. Dr. Goldenberg, a nationally and internationally renowned researcher, taught me how to appropriately “tell the story” behind my research and motivated me to embrace and enjoy the research process. I hope to emulate his kind and gentle teaching style in my own role as an educator and to do justice to his mentoring as I embark on my own future research adventures.

Thank you to Dr. Glasgow for her wisdom, guidance, and imperturbable mentoring style that truly gave me confidence when the twists and turns of this process seemed almost impossible to navigate. Most importantly, her belief in my abilities has opened the doors of opportunity for my personal and professional growth. I can not thank you enough!

I would like to extend my heartfelt gratitude to Dr. Bobbie Posmontier and Dr. Debra Shearer for dedicating their time and effort as my readers. I am very appreciative and honored to have such distinguished and accomplished women to provide feedback on my work and to participate in my final hurdle.

I am incredibly thankful to my mentor and soon to be colleague, Dr. Kathleen Falkenstein for being such an inspiration from the day I met her. My trajectory as a DrNP, to balance the trilogy of academic nursing faculty practice: excellent clinical practice, dynamic education, and meaningful research, is patterned after
Dr. Falkenstein’s achievement of an admirable balance of her own professional career. Her love of all aspects of the nursing profession and her unconditional support of her students instills aspirations that I can only hope to one day achieve. You have been there cheering me on every step of the way. Thank you for everything!

Alis Panzera and Velma Weitz…what can I say? Nothing can compare to the love, support, and friendship that grew between us throughout this learning process. Never will the amount of calories necessary to get through this ever be told! I love and appreciate you both and I am grateful to be friends with two strong, talented, and phenomenon women. To Sharon Byrne and the 2006 cohort…never have I been more proud to be a part of such a supportive and cohesive class. We have redefined the definitions of hard work and determination.

Dr. Marcia Polansky, my extremely talented statistician, distilled the multifaceted world of statistics and brilliantly helped design a seamless research project. I could have never accomplished this without your patience, guidance and easy accessibility. Anand Bhattacharya, I can not even express how invaluable you have been during this journey. The countless hours of drawing stick figures and quick witted analogies to make statistics comprehensible will
never be forgotten. Your friendship, support, and cultural perspectives have enriched my life and also the lives of my family. Thank you!

I was fortunate to experience life and health care through my DrNP clinical practicum experience in the Dominican Republic with Tom and Melanie Gellhaus. With their help, I was fortunate to participate in an international experience that has given me new direction and profoundly changed my life. I look forward to many more mission trips and giving back to the women of the DR who have increased my determination to investigate cervical cancer and given me so much.

My dissertation acknowledgement would not be complete without expressing my gratitude to Fred Bender who relived my panic attacks by retrieving my “lost” work from cyber space more times than I’d even like to admit and to Devon Montgomery for all the Starbuck’s coffee runs to keep me sane. Thank you and I love you both.

Special thanks to all my research staff members…there is no way this study could have been executed without your hard work and dedication. Lastly, thank you to the anonymous participants in my study. Although I will never know who you are, I will be forever indebted to you for your kindness and selfless willingness to participate in research that may improve the lives of women. This program and process had helped me realize the change I need to be, to truly
make a difference in the world. The tracks of a new journey have been set and I look forward to exploring how I will continue to “become the change” needed to enrich health care for women in the world. Thank you for this amazing opportunity!
# Table of Contents

LIST OF TABLES......................................................................................................................................... xi

LIST OF FIGURES....................................................................................................................................... xii

ABSTRACT .................................................................................................................................................. xiii

1. INTRODUCTION .................................................................................................................................1

  1.1 Specific Aims ...................................................................................................................................3

2. BACKGROUND AND SIGNIFICANCE ..............................................................................................5

  2.1 HPV and Cervical Cancer: Scope of the Problem ................................................................. 5

  2.2 Knowledge of HPV and Cervical Cancer in Women .......................................................... 9

  2.3 Health Beliefs ..............................................................................................................................13

  2.4 Preventative Measures ..............................................................................................................16

  2.5 Summary .......................................................................................................................................23

3. METHODS ...........................................................................................................................................24

  3.1 Design ...........................................................................................................................................24

  3.2 Site Selection ..............................................................................................................................24

  3.3 Population Sample Size ............................................................................................................25

  3.4 Measurement of Variables .......................................................................................................26

  3.5 Procedure for Data Collection ................................................................................................28

  3.6 Data Management and Analysis .............................................................................................31

  3.7 Protection of Human Subjects ...................................................................................................32
List of Tables

Table 1- Socio-demographic Characteristics of Study Participants ......................... 38

Table 2- HPV and Cervical Cancer Knowledge and Health Beliefs Scores in Women Aged 40 - 70 Years ................................................................. 41

Table 3- Frequency of Responses for Questions Regarding HPV/Cervical Cancer Knowledge in Women Aged 40 - 70 .............................. 43

Table 4- Frequencies of Susceptibility Responses in Women Aged 40 – 70 ...... 45

Table 5- Frequencies of Seriousness Responses in Women Aged 40 – 70 ........... 47

Table 6- Means and Standard Deviations Comparing Three Subgroups of Women Aged 40 - 50, 51 - 60 and 61 - 70 Years for Knowledge, Susceptibility and Seriousness Scores ............................................. 49

Table 7- Means, Standard Deviations and Post Hoc Analysis Comparing Three Subgroups of Women Aged 40 – 50, 51 - 60, and 61 - 70 Years for Seriousness Scores Only ................................................................. 51

Table 8- Comparison of Frequency and Percentage of Participant Responses to Preventative Practices Between Women Aged 19 - 26 Years and 40 - 70 Years ................................................................. 53

Table 9- Frequency and Percentage of Participant Responses to Preventative Practices Separated by Groups ......................................................... 59

Table 10- Pearson Correlations Between Scores of Knowledge, Susceptibility and Seriousness for the Women Aged 40 - 70 Years Old .............................. 61

Table 11- Adjusted and Unadjusted Mean (SD) for Knowledge, Susceptibility and Seriousness for Younger and Older Groups of Women Using Socio-Demographics as a Covariate ............................................. 65
List of Figures

Figure 1- HPV and Cervical Cancer Health Belief Model Schematic..................15
Figure 2- HPV Testing Management for the Woman > 40 Years of Age ............20
Figure 3- Data Collection Procedures .............................................................29
Figure 4- Participant Flow Chart ........................................................................36
Figure 5- Sexual Experience in Women 40 - 70 Years of Age ..........................55
Figure 6- Condom Use in Women 40 - 70 Years of Age .................................57
Figure 7- Means of Knowledge for Different Races of Entire Study Population...67
Figure 8- Means of Knowledge for Different Races of Entire Study Population....68
INTRODUCTION: Genital Human Papillomavirus (HPV) infection is the most common sexually transmitted disease in the United States and the proven etiology of cervical cancer. Recent studies suggest a bimodal HPV prevalence for women of two age groups: 19 - 26 and 40 - 70. HPV and cervical cancer knowledge has yet to be investigated in the older population of women. The objective of this study was to evaluate and compare the HPV and cervical cancer knowledge, health beliefs, and preventative practices in women of two age groups: women aged 19 – 26 and women aged 40 - 70.

METHODS: This study employed a cross-sectional, descriptive design. A convenience sample of 300 women was recruited from three ambulatory Ob/Gyn practices in Philadelphia. Participants filled out the “Awareness of HPV and Cervical Cancer Questionnaire” to determine their HPV and cervical cancer knowledge, health beliefs and preventative practices.

RESULTS: Two hundred and eighty responses (n = 131 aged 19 – 26 years; n = 149 aged 40 – 70 years) were received. Participants identified themselves as mostly Caucasian (55.40%) and African American (29.60%), college graduates.
(42.90%), Catholic (38.60%) or Christian (31.80%), mostly single (42.90%) or married (34.30%), with an annual income of $41,000-60,000 (27.40%) and private health insurance (80%). Significant differences were found between the two groups for knowledge ($p = 0.010$) only, but not for health beliefs (perceived susceptibility ($p = 0.111$) and perceived seriousness ($p = 0.266$)). Significant differences of select preventative practices were also noted between these two groups. These included pap smear ($p = 0.05$), use of condoms ($p = 0.002$), and use of oral contraception ($p < 0.001$).

CONCLUSION: There is a remarkable need for age appropriate HPV and cervical cancer awareness and education for women over the age of 40. Women’s health care providers are perfectly positioned to act as a catalyst to improve HPV and cervical cancer knowledge, health beliefs and preventative practice to ensure optimum health promotion for all women.
CHAPTER 1: INTRODUCTION

Genital Human Papillomavirus (HPV) infection is the most common sexually transmitted disease in the United States (Markowitz et al, 2007). Approximately 20 million Americans are currently infected with one or more strains of low risk and/or high risk HPV, while more than 6 million will become newly infected each year (World Health Organization (WHO), 2008). Recent advances demonstrate that HPV, spread primarily through skin-to-skin contact during sexual activity, is the etiologic agent of genital warts and can be isolated in 99.7% of cervical cancer cases (Bosch, Lorinz, Munoz, Meijer, & Shah, 2002; Munoz et al., 2003; Parkin, 2006). HPV related cancer is the second leading cause of cancer deaths in women worldwide, including over 4,000 deaths in the United States this year alone (Dunne et al, 2007; WHO, 2008). Therefore, it is evident that HPV related cervical cancer affects millions of women and is responsible for significant morbidity and mortality worldwide, approximately 300,000 deaths annually (WHO, 2008).

Although previous studies have demonstrated a decline in HPV prevalence as women age, research instead suggests that a bimodal HPV prevalence distribution is present showing a first peak around the age of 20 years and a second peak around age 40 - 50 years (Herrero, et al., 2000; Lazcano-Ponce et al, 2001; Molano et al., 2002; Munoz et al., 2004). Fluctuations in relationship
infrastructure where there are increases in divorce rates and infidelity disclosures, and acceptance of non-traditional sexual relationships, place women at age 40 and over to be at a higher risk of sexually transmitted disease exposures. A plethora of studies have demonstrated limited HPV knowledge and health beliefs in both the adolescent and college age populations (Baer, Allen, & Braun, 2000; Burak & Meyer, 1998; Ingledue et al., 2004; Friedman & Shepeard, 2007; Vail-Smith & White, 1992). Multi-level educational interventions have targeted preteens, teenagers, and college students regarding HPV and its relation to cancer. Overlooked are women age 40 and over, despite the fact that 80% of women will be infected with HPV by the age of 50 and 35% of cervical cancer deaths occur in women over the age of 65. Consequently, women over the age of 40 may not believe themselves at risk and, therefore, may not practice preventive measures that can potentially save their lives. In addition, although HPV also affects women over the age of 40, there are no current HPV educational campaigns or prevention vaccinations targeting middle age and older adult female populations.

The objective of this particular study was to evaluate the knowledge, health beliefs, and preventative practices regarding cervical cancer and HPV in women of two age groups: women aged 19 - 26 and younger and women aged 40 - 70. In keeping with the goals of Healthy People 2010 to help individuals of all ages increase life
expectancy and improve their quality of life, as well as reduce the number of new cancer cases and the illness, disability, and death caused by cancer, it is essential to understand HPV and cervical knowledge needs of women in age groups (U.S. Department of Health and Human Services, 2007). Thus, as the rate of cervical cancer increases with age, it is our long term goal to appropriately design educational resources and prevention strategies to improve the lives of women with HPV and decrease cervical cancer mortality and morbidity, especially in women 40 years of age and older.

Specific Aims

The specific aims of this study were two-fold:

1. **Aim 1:** Assess HPV/cervical cancer knowledge, health beliefs, and preventative practices in women age 40 - 70.

2. **Aim 2:** Compare HPV/cervical cancer knowledge, health beliefs, and preventative practices between two groups of women: women age 19 -26 and women age 40 - 70.

Hypothesis: Women aged 40 – 70 years have less knowledge regarding HPV and cervical cancer knowledge, perceive themselves less susceptible to its acquisition, perceive HPV and cervical cancer to be less serious than
other diseases, and use less preventative practices as compared to women aged 19 – 26 years.

In light of the new evidence showing that HPV prevalence in women may have a bimodal distribution, rising in midlife rather than declining with advancing age, this study is novel and innovative because it examined knowledge of HPV/cervical cancer, health beliefs, and preventative practices in women 40 - 70 years of age and older and compared them to what we currently know about such variables in the 19 - 26 age group whom have been the target of most national HPV public awareness and prevention programs. Using the “Awareness of HPV and Cervical Cancer Questionnaire” (Ingledue et al., 2004), this study employed a cross-sectional, descriptive research design. These findings may be vital to a more comprehensive understanding of the health care needs of high risk women in order to appropriately direct educational resources and to save the lives of women from this preventable disease.
CHAPTER 2: BACKGROUND AND SIGNIFICANCE

Genital Human Papillomavirus (HPV) infection is the most common sexually transmitted disease in the United States (Markowitz et al., 2007). Recent advances in science demonstrate that HPV, spread primarily through skin-to-skin contact during sexual activity, is the etiologic agent of genital warts and can be isolated in 99.7% of cervical cancer cases (Bosch, et al., 2002; Munoz et al., 2003; Parkin, 2006). HPV related cancer is the second leading cause of cancer deaths in women worldwide, including over 4,000 deaths in the United States this year alone (Dunne et al, 2007; WHO, 2008). Therefore, it is evident that HPV related cervical cancer affects millions of women and has significant morbidity and mortality worldwide.

HPV and Cervical Cancer: Scope of the Problem

Approximately 20 million Americans are currently infected with one or more strains of low risk and/or high risk HPV, while more than 6 million will become newly infected each year (Weinstock, Berman, & Cates, 2004). Infections with low-risk types (e.g., types 6 and 11) may cause benign or low-grade cervical cell changes, genital warts, and recurrent respiratory papillomatosis (Markowitz et al., 2007). However, high-risk HPV types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 69, 73, and 82) may act as carcinogens in the development of cervical cancer and other anogenital cancers (NIH, 1996; WHO, 2008). These types can
potentially cause low-grade cervical cell abnormalities, high-grade cervical cell abnormalities that are precursors to cancer, and anogenital cancers (Munoz et al., 2003). However, women of all ages continue to be shocked and devastated upon receiving the diagnosis of HPV, a cancer causing, sexually transmitted disease (Garcia et al., 2007; Kahn et al, 2005; Keller, von Sadovsky, Pankratz, & Hermesen, 2000; McCafferty, Waller, Nazroo, & Wardle, 2006; Perrin et al., 2006).

Multi-level educational interventions have been aimed to inform preteens, teenagers, and college students about sexually transmitted disease, specifically HPV and its relation to cervical cancer. Overlooked are middle-age and older women, despite the fact that 80% of women will be infected with HPV by the age of 50 and 35% of cervical cancer deaths occur in women over the age of 65 (CDC, 2008). Studies have demonstrated limited HPV knowledge and health beliefs in both the adolescent and college age populations but lacking are current published studies specifically examining knowledge and health beliefs in women over the age of 40. In clinical practice, many women over the age of 40 are unaware of either HPV as a STD or its relation to cervical cancer. Hence, middle-aged and older women may not believe themselves at risk and may not practice preventive measures that can potentially save their lives. Compounding this may be their shock when their pap smear results reveal a diagnosis of HPV-a STD.
Cervical cancer usually progresses slowly from precursor HPV lesions to invasive cancer during a period of 10 to 15 years; however, it is highly preventable and treatable with routine Pap smears and appropriate follow up (Gerberding, 2004). Since survival rates for cervical cancer are over 90% if detected early and managed properly, it is crucial that women of all ages be armed with a strong knowledge base of HPV, including its acquisition, its potentially serious consequences, and prevention strategies in order to make informed decisions for their own health and wellness (Friedman & Shepeard, 2007).

According to the data from the National Health and Nutrition Examination Study (NHANES) 2003-2004, the prevalence of HPV among U.S. females (N=2026) aged 14 to 59 years was 26.8%, with the highest prevalence (33.8%) among adolescent and college age women (aged 14 - 26) and the lowest prevalence in middle aged (40 - 49 years) and older women (50 - 59 years) at 25.2% and 19.9% respectively (Dunne et al., 2007). Although this study demonstrates a drop in HPV prevalence as women age, it is not eradicated and HPV continues to threaten the lives of many women in this age group. According to these data, essentially one out of every four women over the age of 40 has already been exposed to HPV.
Studies done utilizing worldwide populations at high risk for cervical cancer suggest a bimodal HPV prevalence distribution showing a first peak around the age of 20 years and a second peak around age 40-50 years (Herrero, et al., 2000; Lazcano-Ponce et al., 2001; Molano et al., 2002; Munoz et al., 2004). New or promiscuous sexual partners, menopausal hormonal changes, physiologic changes at the cervix with aging that increase the efficiency of HPV detectability by current sampling methods, or re-emergence of latent HPV infections may account for this second rise (Baay et al., 2004; Castle et al, 2005; Molano et al, 2002; Sellors et al., 2000; Strickler et al, 2005).

Despite recent attempts by health agencies, pharmaceutical companies, news media, special interest groups, and the internet to provide education specifically targeted to the adolescent and college age population about HPV, the information is often conflicting, inaccurate, outdated, biased, incomplete, or written at inappropriately high literacy levels for general audiences, contributing to public confusion about HPV (Anhang, Stryker, Wright, & Goldie, 2003; Brandt, McCree, Lindley, Sharpe, & Hutto, 2005; Friedman & Shepeard, 2007; Stevens, Daley, Perrin, & McDermott, 2004). In addition, although HPV also affects women over the age of 40, there are no current HPV educational
campaigns or prevention vaccinations targeting middle age and older adult female populations.

**Knowledge of HPV and Cervical Cancer in Women**

Knowledge applies to facts or ideas acquired by study, investigation, observation, or experience (Merriam Webster Dictionary, 2007). Numerous researchers have conducted both quantitative and qualitative studies to examine the knowledge of HPV and cervical cancer in female high school students and college women from diverse ethnic, socioeconomic, and educational backgrounds and residing in the United States or Europe (Baer, Allen, & Braun, 2000; Burak & Meyer, 1998; Ingledue et al., 2004; Friedman & Shepeard, 2007; Vail-Smith & White, 1992). Although the results generally show a significant lack of HPV and cervical cancer awareness in these high risk groups, the varying levels of knowledge can be divided into three distinct categories: a) Minimal or No Knowledge; b) Partial Knowledge without Association; and c) Full Knowledge with Concern.

**Minimal or No Knowledge**

Females in the “Minimal or No Knowledge” group reported either no previous or current knowledge of HPV or acknowledge the existence of HPV, but can not identify it as a medical diagnosis or a disease. Although the studies reviewed had different sample characteristics, and data collection methods, some
consistent findings were apparent. In 2000, a national survey of women found that only 2% of the American public knew that there was “something” called HPV and that less than one third had ever heard of it (Henry J. Kaiser Family Foundation, 2000). More recent national surveys of women have found somewhat higher rates of HPV knowledge, although the majority of women are still unaware of HPV (Association of Reproductive Health Professionals, 2005; National Cervical Cancer Coalition, 2006). Many studies in the United States and Europe showed that both non sexually active and sexually active adolescents and college age women lack awareness and knowledge of HPV. These groups of young women are at considerable risk of contracting the virus and may not be taking appropriate measures that would reduce the risk of HPV infection and sequelae presently or in the future (Dell, Chen, Ahmad, & Stewart, 2000; Gerhardt, Pong, Kollar, Hillard, & Rosenthal, 2000; Vail-Smith & White, 1992; Yacobi, Tennant, Ferrante, Pal, & Roetzheim, 1999).

*Partial Knowledge without Association*

Women with partial knowledge without association identify HPV with a sexually transmitted disease, but they do not equate HPV with cervical cancer pathology. In Vail-Smith & White’s (1992) study, 5% of the college age sample indicated that they believed that HPV only caused genital warts. In addition, many adolescents and college women (76%) believe that HPV can be eradicated
by antibiotics (Ramirez, Ramos, Clayton, Kanowitz, & Moscicki, 1997). Lack of HPV understanding was evidenced in studies showing that many of the studied women also believe that condoms would provide full protection from HPV (Mays et al., 2007) and rarely is abstinence mentioned as a means of protection by both adolescents and college age women (Burak & Meyer, 1997; Mays et al., 2007).

Confusion about the transmission of HPV was evident in studies done in women under the age of 25 where 59 to 75% of the participants were unaware of how the virus is spread (Holcomb, Motino, Bailey, Crawford, & Ruffin, 2003; Yacobi et al., 1999). Some studies report females’ common misconceptions including that HPV affects men more than women, are a form of herpes, and are contagious only when the lesions burst (D’Urso, Thompson-Robinson & Chandler, 2007; Friedman & Shepeard, 2007). In addition, Dell et al.‘s study (2000) suggest that women knew HPV was a sexually transmitted disease but they had limited knowledge of the range of symptoms associated with the virus (asymptomatic, genital warts, abnormal pap tests, and cervical cancer) and they did not understand the indications for performing a pap smear. A number of investigations demonstrated that a large percentage of women lacked or had erroneous understandings about the purpose of pap smears, the function of the test, or how to interpret the results (Mays et al., 2007). Knowledge of HPV as a sexually transmitted disease was much higher among women (mean age = 22)
with an HPV diagnosis through genital wart diagnosis or abnormal pap who had received on going education about the virus (Waller, Marlow, & Wardle, 2006).

**Full Knowledge with Concern**

Lastly, published studies show that female participants who have a full awareness of HPV understand that HPV is a sexually transmitted disease and that there is a definite link to HPV with cervical cancer. Not only do women in this category appreciate the associated potential risks and consequences of HPV, they have both social and psychological implications surrounding the virus itself, transmission, prevention, treatment, and HPV links to significant health diseases (McCafferty, Waller, Nazarro, & Wardle, 2005). Respondents of only a few studies are able to link high risk HPV to cervical cancer (Bell, Porter, & Kitchener, 1995; McCafferty et al., 2005; D’Urso et al., 2007). Many women studied (mean age = 17) who have an accurate understanding of the virus have either been diagnosed with it themselves or have a close friend or relative with HPV (Kahn et al., 2007). Holcomb et al.’s study (N=289) show that some women (mean age = 30) have learned about HPV from health care professionals (30%), class (29%), clinics (23%), friends (22%), teachers (18%), and parents and partners (< 8%).

The current research confirms a possible connection between HPV knowledge and psychosocial concerns. Positive results of HPV testing showing low or high risk types may lead to a significant increase in anxiety, distress, and
concern about sexual relationships (Friedman & Shepeard, 2007; Massi et al., 2004; McCafferty et al., 2003). Waller, Marlow, and Wardle (2006) add that women (mean age = 22) given HPV diagnosis experience anger depression, fear of rejection, guilt, and shame. Stigma associated with sexually transmitted disease has been well documented in the published literature, but is only in its infancy stage in relation to HPV specifically (Dell at el, 2000; Kahn, et al 2007; Waller, McCafferty, Forrest, & Wardle, 2004). Stigma, as defined by Goffman (1963) is an attribute that is deeply discrediting, spoiling, tainting, or making someone seem inferior in the eyes of others, partly because that individual may fail to live up to the expectations of others. Stigma can be considered a pejorative social label (Duncan, Hart, Scolar, & Bigrigg, 2001) and promotes social isolation (Goffman, 1963).

Health Beliefs

Women’s understanding of the HPV infection and awareness of preventative measures is important but insufficient in protecting against this potentially life altering virus. Belief that this virus is a personal and viable risk is the cornerstone to a woman’s interest in knowledge and active participation strategies to protect against HPV. Health care providers can easily discuss HPV and the protective mechanisms, but if women do not believe themselves at risk, they are less likely to utilize preventative behaviors.
Clinicians need to appreciate and understand their patients’ health beliefs’ - especially in women aged 40 and older who have not been a target of all the marketing information about HPV and the new vaccine. Understanding the Health Belief Model (HBM) is insightful (Figure 1). The HBM has been previously used to explain and predict health behaviors and health issues by focusing on the knowledge, attitudes, and beliefs of individuals. Developed in the 1950’s by a group of psychologists in the United States Public Health Service to explore the widespread failure of individuals to participate in health screening and prevention programs (Rosenstock, Strecher, & Becker, 1994), the HBM has been adapted to investigate a myriad of short and long-term health behaviors regarding Acquired Immunodeficiency Syndrome (AIDS) transmission, cigarette smoking behavior, mammography screenings, vaccination programs, and prediction of condom usage (Ingledue et al., 2004; Stretcher & Rosenstock, 1997).
Figure 1. HPV and Cervical Cancer Health Belief Model Schematic

The Health Belief Model and HPV risk behavior change. (Adapted from Rosenstock et al, 1994).
The HBM is composed of five core concepts: perceived threat perceived benefits, perceived barriers, cues to action, and self efficacy. Particularly relevant to discussing HPV with women over 40 is the concept of perceived threat which consists of two constructs: perceived susceptibility and perceived severity. Perceived susceptibility is defined as an individual’s opinion of the chances of getting a condition while perceived severity is that individual’s opinion of the seriousness of the condition and its related consequences. Thus it is essential for clinician’s to investigate the health belief of women over the age of 40 regarding HPV in order to connect their patient’s knowledge and the increase likelihood of appropriate preventative measures.

Preventative Measures

The World Health Organization (WHO) (2008) defines primary prevention as all activities designed to ‘reduce’ the instances of an illness in a population and thus to reduce, as far as possible, the risk of appearance of new cases. As the understanding of the pathophysiology and transmission of HPV broadens, a plethora of preventative measures designed to reduce and possibly eliminate HPV transmission and its sequelae have been suggested throughout the literature.

Human Papillomavirus can be transmitted through both sexual and non sexual behaviors. Genital HPV infection is primarily transmitted by genital skin
to skin contact, usually through sexual intercourse (CDC, 2007). Studies report that as many as three quarters of individuals sexually exposed to genital warts have been reported to subsequently develop genital warts (Campion, Singer, Clarkson & McCance, 1985). HPV transmission through other types of genital contact in the absence of penetrative intercourse (i.e. oral-genital, manual-genital, and genital-genital contact) has been described, but is less common than through sexual intercourse (Fairley, Gay, Forbes, Abramson, & Garland, 1995; Marrazzo, Stine, & Koutsky, 2000; Winer, Hughes, Adam, Kiviat, & Koutsky, 2003). Although rare, HPV can also be transmitted by non sexual routes, specifically from mother to newborn baby, through both Caesarean and vaginal birth (Puranen, Yliskoski, Saarikoski, Syrjanen, & Syrjanen, 1996; Tenti, 1999; Watts et al., 1998). Research also suggests that HPV virus may also be transmitted through fomites on inanimate objects that were recently in contact with HPV such as clothing, toilet seats, and used gloves by health care providers (Ferenczy, Bergeron, & Richart, 1989; Strauss, Sastry, Sonnex, Edwards, & Gray, 2002).

The link between HPV and cervical cancer has triggered research directed at primary prevention through vaccination development, rigid cervical screening (pap smear) and HPV reflex testing recommendations, and educational programs promoting safe sexual practices. According to the CDC (2007), abstinence is the most effect approach to HPV infection protection. Sexual
activity with a monogamous, uninfected partner also provides full protection from sexually contracted HPV (CDC, 2007). In addition, the available scientific evidence demonstrates that correct condom use may decrease the acquisition of genital HPV and HPV associated diseases up to 70%, but this strategy does not provide full protection (CDC, 2007; Slattery et al., 1989; Winer et al. 2006; Zondervan, Carpenter, Painter, & Vessey, 1996).

Routine pap smears for all sexually active women is the primary screening method for early detection of cervical irregularities related to HPV and is crucial for the prevention of cervical cancer (American College of Obstetricians and Gynecologists (ACOG), 2005; Ferenczy & Franco, 2001; Saslow et al., 2002; U. S. Preventative Services Task Force (USPSTF), 2008). Although cervical cancer is a rare outcome of HPV, it can progress from an invisible precursor lesion to invasive cancer anytime, but with the highest increase in progression during a period of about 10 to 15 years (Friedman & Shepeard, 2007). New 2006 consensus guidelines recommend that all women should have a pap test for cervical cancer screening within three years of the onset of sexual activity or by age 21, whichever occurs first, followed by a pap screening every one to three years to ensure early detection (American Cancer Society (ACS), 2007; American Society for Colposcopy and Cervical Pathology (ASSCP) (2006); Wright et al., 2007). Interestingly enough, approximately half of women who had cervical
Cancer diagnosed in the U.S. had not had a pap smear in the three years before the diagnosis (CDC, 2007). Clinicians must be aware that new pap smear guidelines with HPV reflex testing have been issued in 2006. Figure 2 provides an algorithm for HPV testing and management for the woman > 40 years of age. Appropriate pap and HPV screenings, limited sexual partners, adequate nutrition, safe sexual practices, and avoidance of smoking are HPV preventative measures that can ultimately save the lives of women of any age (ACOG, 2005; CDC, 2007; USPSTF, 2008).
Figure 2. HPV testing management for the woman > 40 years of age

[Diagram of HPV testing management for women > 40 years of age]

*2006 Consensus Guidelines sponsored by American Society Colposcopy and Cervical Pathology (Wright et al., 2007)
**ASCCP = American Society Colposcopy and Cervical Pathology. The above figure was created using the 2006 Consensus Guidelines
Additionally, other factors have been implicated as secondary causes between HPV and cervical cancer (ACS, 2007). HPV infection and smoking have long been independently linked to cervical cancer, however, a landmark study by Gunnell and colleagues (2006) demonstrated a synergetic effect between these the two entities. Women who smoke while concurrently being infected with high levels of the HPV increase their risk for cervical cancer by as much as 27-fold (Gunnel, et al, 2006). The immune system plays a critical role in eliminating viral infections. Thus cigarette smoking causes an immune response disruption, possibly inhibiting the body’s ability to suppress or clear the HPV virus and accelerating the progression of neoplastic growth (Gunnel, 2006; Moscicki, 2001).

Evidence shows that long-term use of oral contraception (OC) (5 or more years) may also be associated with an increased risk of cervical cancer (NIH, 2006). An analysis from 28 studies that included 12,531 women with cervical cancer found an increased risk of cervical cancer with longer use of OCs (Smith, et al, 2003). In another report, data from eight studies were combined to assess the effect of OC use on cervical cancer risk in HPV-positive women (Franceschi, 2005). Researchers found a fourfold increase in risk among women who had used OCs for longer than 5 years.

Lastly, the Food and Drug Administration (FDA) approved the first quadrivalent HPV vaccine, Gardasil, licensed to be given to females between the
ages of 9-26 to prevent cervical cancer and infection from HPV types 6, 11, 16, and 18 (CDC, 2007; Koutsky et al., 2002; Mao et al, 2006). This prophylactic vaccine, made from non-infectious HPV-like particles (VLP), offers a promising new approach to the prevention of HPV and associated conditions. However, this vaccine will not replace other prevention strategies since it will not work for all genital HPV types (CDC, 2007). If the vaccine is given prior to exposure to any of the four subtypes, the efficacy approached 100 percent in the prevention of HPV and HPV related diseases (Merck, 2006). Since acquisition of all four subtypes in one individual is rare, vaccine given to women with previous HPV exposure to one or more types of HPV will not eradicate disease, but will provide protection from unexposed subtypes (CDC, 2007, Merck, 2006).

Promising, unpublished studies have been presented as recently as November 2007 at the 24th International Papillomavirus Conference (IPC) in Beijing, China regarding safety and efficacy of Gardasil in women age 24 - 45 are ongoing to assess the efficacy of this vaccine in women ages 26 - 45. It is possible that with continued research, vaccines may be available for women over the age of 26.
Summary

In today’s society, the high prevalence of HPV and the virus’ cancer causing potential in women warrant women to be appropriately informed about HPV and well equipped with prevention strategies. Although research has shown that prevalence of HPV decreases in women after the age of 24, the risk for HPV and cervical cancer still exists. Existing studies clearly demonstrate that high school and college age women have serious knowledge deficits concerning HPV, hampering their ability to adequately protect themselves from virus sequela and from possible transmission to their partners. Current vaccination opportunities for these young women provide an excellent protective mechanism against cervical cancer. Yet, little attention has been given to women aged 40 and over. Unknown is the extent of the knowledge, the health beliefs, and the preventative methods of women in this under studied age group.
CHAPTER 3: METHODS

The purpose of this research was to explore the relationships of knowledge of HPV and cervical cancer, health beliefs, and preventative practices of women in aged 40 - 70 and compare these relationships with those of women aged 19 - 26.

Design

Using a convenience sample of 300 women, a cross-sectional descriptive study was conducted over a two month time period. In this methods section, specific sampling procedures, survey tools, the data collection process, and data analysis methods are described. In addition, the Protection of Human Subjects within the context of this research has also been detailed.

Site Selection

In order to obtain a heterogeneous sample of women aged 19 – 26 and 40 – 70, women were recruited from three ambulatory obstetrics and gynecology practices of Drexel University College of Medicine in Philadelphia, Pennsylvania. Philadelphia County has the highest cervical cancer death rate in the state of Pennsylvania and compared to the United States data, the rate of cervical cancer in Philadelphia is 1.7 times higher than the national cervical cancer rate (National Cancer Institute (NCI), 2008). Based on the data from the United States Census Bureau (2000), the racial demographics of this study closely resembled the racial profile of the Philadelphia population: Caucasian (55%); African American
women aged 19 – 26 and 40 – 70 years who met the inclusion criteria were invited to participate in this study via a flyer posted in the waiting areas of the three participating offices. The study announcements described the general purpose of the study. The inclusion criteria were: (a) women aged 19 - 26 and 40 - 70; (b) presenting to their health care provider; and (c) who did not have a past or present history of cervical cancer

Population Sample Size

The sample size required for this study was guided by a power analysis using the software program G*Power (Version 3.0.10, Dusseldorf, Germany). The power analysis was based on an independent sample “t test” where two groups (women aged 19 - 26 years, and women aged 40 - 70 years) were to be compared at one time point for the primary dependent variable: knowledge. Small to medium effect size (0.36) was postulated in keeping with Cohen’s (1992) recommendation for differences between cells means (Cohen’s $d$). An effect size is considered to be the smallest immediate effect that is clinically meaningful in the target population for the outcome measures: knowledge. Power was set to 0.80, meaning there would be an 80% probability of reaching statistical significance if there is difference between the groups.
In this study, for a significance level of $\alpha = 0.05$, with an effect size of 0.36, to achieve a power of 0.80, a total sample size of 250 subjects with 125 subjects in each group was required. To ensure adequate power and allow for any attrition, we recruited an additional 50 subjects.

Measurement of Variables

After permission was granted from the author (Appendix 1), The Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al, 2004) was distributed to all study participants to assess knowledge and beliefs, as well as preventative measures in regards to HPV and cervical cancer. Based on the Health Belief Model (HBM) Ingledue and colleagues (2004) developed this research tool to investigate HPV/cervical cancer knowledge, health beliefs and perception, and preventative measures in college age women (Appendix 2). This is a self administered 36-item questionnaire, developed from the constructs of knowledge, perceived threat, and preventative practices to investigate the relationship between a woman’s knowledge of HPV and her health specific behaviors. The knowledge portion of the questionnaire consists of 15 multiple-choice items, with each question permitting only one response. The total number of correct questions provides the knowledge score for this instrument, with possible scores ranging from 0 to 15. The perceived threat portion (seriousness and susceptibility) of cervical cancer consists of 15 questions, using a 5 point
Likert-type scale ranging from strongly agree to strongly disagree. Each potential response is assigned a point value from one to five. Nine of the 15 questions relate to perceived susceptibility and have a possible subtotal score range from 9 to 45. The remaining six questions relate to perceived seriousness and have a potential score that ranges from 6 to 30. The last six questions focus on individual sexual behaviors, risk factors, and history of pap smears, and are multiple choices. It took approximately 25 to 30 minutes for each participant to complete the survey.

Stability reliability of the instrument was established through test-retest procedures with a 10 day interval: knowledge ($r = 0.90$), perceptions and beliefs ($r = 0.95$), and preventative behaviors ($r = 0.90$) (Ingledue et al., 2004). Content validity was determined by using consensual validity via a panel of experts, representing several health professionals including two gynecologists, two professors of health education, and a medical professional from the Breast and Cervical Cancer program.

Socio-demographic variables collected included: age, race, education, insurance coverage, religious affiliation, marital status and income level. In addition three open ended questions were also included for the participant to describe her HPV knowledge and perceptions in her own words.
Procedures

Project staff on this study included the PI and three RAs. The study participants included women aged 19 - 26 and 40 - 70 who presented to one of the three Drexel University College of Medicine Faculty Obstetrics and Gynecology (DUCOM) offices participating in this study for an annual examination and pap smear.
Figure 3. Data collection procedures

- Females from Drexel University Ob/Gyn Offices
- Group A: Ages 19-26 → Demographics & Survey → Data analysis
- Group B: Ages 40-70 → Demographics & Survey → Data analysis
Once each patient checked in at the front desk for her routine clinical examination, the demographics, including date of birth were verified by the front desk personnel as per office protocol (Figure 3). If the patient met the inclusion criteria, the trained front desk attendant notified the PI or the RA. If the patient was interested in participating in the study after full explanation was completed by the PI or the RA, the participant was given the research questionnaire. Questionnaires were color coded for each office: Office 1 (yellow); Office 2 (pink); and Office 3 (blue). No identifiable information was requested on any of the questionnaire materials. For consistency of all data collection, the subject was left alone to complete the questionnaire and was told that questions she may have related to the questionnaire can only be answered after she returned the completed form to the trained front desk in a sealed envelope. Each envelop was marked with an ‘A’ or ‘B’ to designate the age category of the completed questionnaire (‘A’ = aged 40-70 years; ‘B’ = aged 19-26 years). The PI personally picked up the sealed surveys twice a week from the RA in each office, reviewed them for completeness, and entered the data into the SPSS-PC 16.0 data base. All completed research questionnaires remained in a designated locked file drawer until data collection of the study was completed. Recruitment and enrollment continued for two months, when a full sample of 280 was obtained.
Data Management and Analysis

All data management was supervised by the PI. There were no identifying information or codes associated with data used for this study. All data remained strictly anonymous. Quantitative data was coded and entered into SPSS-PC 16.0 on a secure computer that is used for research purposes only. Frequency distributions and measures of central tendency and variability were calculated for all dependant study variables. All values with missing data was tracked.

The specific aims of this study were analyzed as follows:

1. Assess HPV/cervical cancer knowledge, health beliefs, and preventative practices in women aged 40 - 70. Descriptive statistics including frequencies for categorical variables and measures of central tendency (mean) and variances (standard deviation, range, minimum and maximum) for continuous variables were utilized to describe the HPV/cervical cancer knowledge, health beliefs, and preventative practices in women aged 40 - 70. Pearson product-moment correlations were calculated to report the relationship among HPV/cervical cancer knowledge, susceptibility, and seriousness in women aged 40 - 70 years.
2. Compare HPV/cervical cancer knowledge, health beliefs, and preventative practices between two high risk groups of women: women aged 19 - 26 and women aged 40 - 70. To examine differences in knowledge and health beliefs (susceptibility and seriousness) between the younger (19 - 26 years) and older (40 - 70 years) group of women, independent sample t tests was performed. Prior to performing the t tests, groups were compared for similarity in socio-demographic characteristics using a Chi-square test. Analysis of Covariances (ANCOVA) were performed to compare the two groups of women after controlling for any differences in socio-demographic characteristics (education, race, marital status, religion and type of health insurance) as well as confounding effects of sub dimensions of health beliefs (e.g. knowledge and seriousness when comparing susceptibility). Chi-square analysis was used to examine any differences between the groups of women for Preventative Practices. The Fisher’s Exact test was used in place of a Chi-square analysis when the assumption of expected count greater than 5 in each cell was not met. Level of significance for all the tests was set at $\alpha = 0.05$.

Protection of Human Subjects

Prior to any data collection, approval for this study was obtained from the Institutional Review Board (IRB) at Drexel University to protect the subjects in this study. Women aged 19 - 26 and aged 40 - 70 are not considered a vulnerable
population; however, all necessary precautions were taken to ensure protection of human subjects participating in this study. There were no identifiers connected with the data at any time during this study. The Drexel approved PI and RAs informed the participants that their participation in the study is voluntary and anonymous and that their decision whether to participate in the study will not affect their access to or their relationship with their provider in any way.

After a woman was identified as a willing participant, the PI or the RA was notified in person. The potential participant reviewed an explanation of the purpose, protocol, risks, and benefits of the study. Each participant was clearly informed that her participation in the study will remain confidential and that each subject’s identity will be vigorously protected as the data collection procedure ensures anonymity.

Potential Risks

The research team anticipated no problem in IRB approval as the study introduces minimal risk for the participants. A minimal risk for women filling out a survey about sexually knowledge, history, and preventative measures was that they may become emotionally upset when recalling sensitive and personal information. The woman may require extra time and support from the PI or RA to counsel them through this difficult period. Although no additional support
was needed during this study, Anne Chastain, M. F. T. (215-923-1101) was available for immediate referral and appointment

Potential Benefits of the Research to the Subjects

This study provided no direct benefits to the participants of this study. Future patients may benefit from the study findings. The knowledge gained from this study is crucial to both health care provider who treat women and to the women themselves. Identification of knowledge deficits paves the way for the development of educational programs targeted to women over the age of 40 that may decrease HPV transmission and potentially save their lives from HPV-related cervical cancer.
CHAPTER 4: RESULTS

This chapter presents the results of this study. A brief overview of the recruitment results will be discussed, followed by a comprehensive description of the socio-demographics of the population studied. In addition, as described previously in Chapter 3, the results of the analytic testing of each of the research questions will be presented.

Recruitment Results

Utilizing previously described methods of distributing an anonymous survey to women in the waiting room while visiting their women’s health care provider for an annual exam, a total of 300 women from three urban, ambulatory offices affiliated with an academic Department of Obstetrics and Gynecology were approached to participate in this study over a seven week time period. Of the 300 women, 20 women did not meet the inclusion criteria for age. Data from the remaining 280 respondents were eligible for analysis. Participants were classified into two groups based on their age. The first group (Group A) was comprised of women between 19 - 26 years of age (N=131). The second group (Group B) included women between the ages of 40 - 70 years (N=149). Figure 4 presents a flow chart of subject recruitment and classification.
Figure 4. Participant flow chart

Total Participants  
(n=300)

Eligible Participants  
(n=280)

Group A  
(Age 19 - 26)  
(n=131)

Group B  
(Age 40 - 70)  
(n=149)

Ineligible  
(n=20)
Socio-demographics Characteristics

The socio-demographics of all the participants in this study are detailed in Table 1. The respondents identified themselves as mostly Caucasian (55.40%) and African Americans (29.60%), college graduates (42.90%), Catholic (38.60%) or Christian (31.80%), mostly single (42.90%) or married (34.30%), with an annual income of $41,000-60,000 (27.40%) and private health insurance (80%). A Chi-square test comparing the socio-demographic characteristics between the two groups revealed that the two groups were similar for the socio-demographic characteristics of education ($p = 0.236$), type of insurance ($p = 0.081$), and race ($p = 0.062$) but significantly different for marital status ($p < 0.001$), religion ($p = 0.022$), and income level ($p < 0.001$).
<table>
<thead>
<tr>
<th>Socio-demographic characteristics</th>
<th>Total Sample (N=280) 100%</th>
<th>Group A (age 19 - 26) N=131 47%</th>
<th>Group B (age 40 - 70) N=149 53%</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age – mean (S.D.)</td>
<td>37.93 (14.96)</td>
<td>23.22 (2.3)</td>
<td>50.86 (7.60)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Sexual partners – mean (S.D.)</td>
<td>2.62 (3.05)</td>
<td>3.91 (3.8)</td>
<td>1.45 (1.37)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td>p = 0.062</td>
</tr>
<tr>
<td>White (Caucasian/Non-Hispanic)</td>
<td>155 (55.40)</td>
<td>63 (48.10)</td>
<td>92 (61.70)</td>
<td></td>
</tr>
<tr>
<td>African American/Non-Hispanic</td>
<td>83 (29.60)</td>
<td>46 (35.10)</td>
<td>37 (24.80)</td>
<td></td>
</tr>
<tr>
<td>Asian/Hawaiian/Pacific Islander</td>
<td>14 (5)</td>
<td>8 (6.10)</td>
<td>6 (4)</td>
<td></td>
</tr>
<tr>
<td>Hispanic/ Latino</td>
<td>22 (7.90)</td>
<td>13 (9.90)</td>
<td>9 (6)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>6 (2.10)</td>
<td>1 (0.80)</td>
<td>5 (3.40)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td>p = 0.236</td>
</tr>
<tr>
<td>High School graduate</td>
<td>60 (21.40)</td>
<td>22 (16.80)</td>
<td>38 (25.50)</td>
<td></td>
</tr>
<tr>
<td>Some college courses</td>
<td>94 (33.60)</td>
<td>51 (38.90)</td>
<td>43 (28.80)</td>
<td></td>
</tr>
<tr>
<td>College graduate</td>
<td>120 (42.90)</td>
<td>56 (42.70)</td>
<td>64 (43)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>5 (1.80)</td>
<td>2 (1.50)</td>
<td>3 (2)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1 (0.30)</td>
<td>0</td>
<td>1 (0.70)</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Single</td>
<td>120 (42.90)</td>
<td>90 (68.70)</td>
<td>30 (20.10)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>96 (34.30)</td>
<td>21 (16)</td>
<td>75 (50.30)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>7 (2.50)</td>
<td>0 (0)</td>
<td>7 (4.70)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>25 (9.00)</td>
<td>1 (0.80)</td>
<td>24 (16.10)</td>
<td></td>
</tr>
<tr>
<td>Living w/ significant other</td>
<td>31 (11.00)</td>
<td>19 (14.50)</td>
<td>12 (8.10)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1 (0.30)</td>
<td>0</td>
<td>1 (0.70)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
<td>p = 0.022</td>
</tr>
<tr>
<td>Christian</td>
<td>89 (31.80)</td>
<td>48 (36.70)</td>
<td>41 (27.50)</td>
<td></td>
</tr>
<tr>
<td>Catholic</td>
<td>108 (38.60)</td>
<td>43 (32.75)</td>
<td>65 (43.60)</td>
<td></td>
</tr>
<tr>
<td>Jewish</td>
<td>23 (8.20)</td>
<td>5 (3.80)</td>
<td>18 (12.10)</td>
<td></td>
</tr>
<tr>
<td>Muslim</td>
<td>4 (1.40)</td>
<td>2 (1.50)</td>
<td>2 (1.30)</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>54 (19.40)</td>
<td>32 (24.50)</td>
<td>22 (14.80)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>2 (0.60)</td>
<td>1 (0.75)</td>
<td>1 (0.70)</td>
<td></td>
</tr>
<tr>
<td>Income Level</td>
<td></td>
<td></td>
<td></td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>0 – 20K</td>
<td>26 (9.30)</td>
<td>16 (12.30)</td>
<td>10 (7.00)</td>
<td></td>
</tr>
<tr>
<td>21-40K</td>
<td>68 (24.30)</td>
<td>48 (36.60)</td>
<td>20 (13.40)</td>
<td></td>
</tr>
<tr>
<td>41-60K</td>
<td>77 (27.40)</td>
<td>40 (30.50)</td>
<td>37 (24.80)</td>
<td></td>
</tr>
<tr>
<td>61-80K</td>
<td>38 (13.40)</td>
<td>12 (9.20)</td>
<td>24 (16.20)</td>
<td></td>
</tr>
<tr>
<td>80K or more</td>
<td>56 (20.00)</td>
<td>9 (6.80)</td>
<td>47 (31.60)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>16 (5.60)</td>
<td>6 (4.60)</td>
<td>10 (7.00)</td>
<td></td>
</tr>
<tr>
<td>Health Insurance</td>
<td></td>
<td></td>
<td></td>
<td>p = 0.081</td>
</tr>
<tr>
<td>None</td>
<td>9 (3.20)</td>
<td>5 (3.80)</td>
<td>4 (2.70)</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>224 (80.00)</td>
<td>98 (74.75)</td>
<td>126 (84.60)</td>
<td></td>
</tr>
<tr>
<td>Public Funded</td>
<td>28 (10.10)</td>
<td>15 (11.50)</td>
<td>13 (8.60)</td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td>16 (5.80)</td>
<td>12 (9.20)</td>
<td>4 (2.70)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>3 (0.90)</td>
<td>1 (0.75)</td>
<td>2 (1.40)</td>
<td></td>
</tr>
</tbody>
</table>
As seen in Table 1, within the older group of women, more reported being married (50.30%) compared to the younger group (16%), while more single women were present in the younger group (68.70%) than in the older group (20.10%). Differences in religious representation were due to the number of women reporting that their religion was “Catholic” being significantly higher in the older group (43.60%) compared to the younger group (32.75%), along with more women in the older group identifying their relationship as Jewish (12.10% compared to 3.80%). In contrast, there was significantly higher percentage of women reporting their religious representation as “Christian” in the younger group (36.70%) compared to the older group (27.50%) along with “Other” religions. Income levels were significantly higher in the older group with 31.60% of the women reporting a total annual household income of $80,000 or more. In contrast, most respondents in the younger group reported their annualized income level to be either between $21,000- $40,000 (36.60%) or between $41,000- $60,000 (30.50%). Health insurance status was similar in the two groups with the majority of the participant’s reportedly carrying private insurance. It should be noted that although race was not significantly different between the two groups, the older group were more likely to be Caucasian (61.70%) compared to the younger group (48.10%) ($p = 0.062$).
Research Questions

**Research Question 1:** Assess HPV/cervical cancer knowledge, health beliefs, and preventative practices in women age 40 - 70.

The HPV/cervical cancer knowledge, health beliefs (susceptibility and seriousness), and preventative practices were measured using the Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al., 2004). Research Question 1 was answered by generating descriptive estimates for the questionnaire measures: knowledge, health beliefs, and preventative practices. Estimates included frequencies and percentages for preventative practices (categorical variables) as well as measures of central tendency (mean) and measures of variation (standard deviation ($SD$), range, minimum and maximum scores) for knowledge and health beliefs (continuous variables). The overall score for the Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al., 2004) for women in this group was 53.23 ($SD =7.40$). Descriptive statistics for knowledge and health belief scores of women aged 40 - 70 are summarized in Table 2.
Table 2

*HPV and Cervical Cancer Knowledge and Health Beliefs Scores in Women Aged 40 - 70 Years*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (SD)</th>
<th>Range</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>7.39 (3.42)</td>
<td>14</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>26.11 (4.64)</td>
<td>26</td>
<td>18</td>
<td>44</td>
</tr>
<tr>
<td>Seriousness</td>
<td>19.73 (2.87)</td>
<td>16</td>
<td>13</td>
<td>29</td>
</tr>
</tbody>
</table>
Knowledge

The mean score for knowledge, measured by the 15 items on the Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al., 2004) was 7.39 ($SD = 3.42$) out of a possible 15. The minimum and maximum score was 1 and 15 respectively. Table 3 represents the frequency of correct and incorrect responses for each item of the knowledge subscale of the Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al., 2004). It should be noted that over half (50%) of the women aged 40 – 70 responded incorrectly to knowledge questions 1, 2, 3, 10, 12, and 15.
Table 3

Frequency of Responses for Questions Regarding HPV/Cervical Cancer Knowledge in Women Aged 40 - 70.

<table>
<thead>
<tr>
<th>Question</th>
<th>Correct</th>
<th>Incorrect (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Multiple Choice</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. The virus associated with cervical cancer is transmitted by:</td>
<td>66</td>
<td>83 (55.70)</td>
</tr>
<tr>
<td>2. Cervical cancer and pre cancer cells are associated with the presence of:</td>
<td>40</td>
<td>109 (73.20)</td>
</tr>
<tr>
<td>3. Cervical cancer can be diagnosed by:</td>
<td>32</td>
<td>117 (78.50)</td>
</tr>
<tr>
<td>4. Prevention of cervical cancer may require:</td>
<td>84</td>
<td>65 (43.36)</td>
</tr>
<tr>
<td>5. HPV can cause:</td>
<td>98</td>
<td>51 (34.22)</td>
</tr>
<tr>
<td>6. HPV can live in the skin without causing growths or changes:</td>
<td>82</td>
<td>65 (44.22)</td>
</tr>
<tr>
<td><strong>Risk Factors (yes or no)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Multiple sex partners</td>
<td>100</td>
<td>49 (32.89)</td>
</tr>
<tr>
<td>8. Having genital warts</td>
<td>76</td>
<td>71 (48.30)</td>
</tr>
<tr>
<td>9. Sexual intercourse before 18</td>
<td>75</td>
<td>74 (49.66)</td>
</tr>
<tr>
<td>10. Taking illegal drugs</td>
<td>27</td>
<td>122 (81.90)</td>
</tr>
<tr>
<td>11. Having contracted any STDs</td>
<td>85</td>
<td>62 (42.18)</td>
</tr>
<tr>
<td>12. Smoking cigarettes</td>
<td>33</td>
<td>115 (77.70)</td>
</tr>
<tr>
<td>13. Poor diet or nutrition</td>
<td>79</td>
<td>69 (46.62)</td>
</tr>
<tr>
<td>14. Using tampons</td>
<td>101</td>
<td>48 (32.21)</td>
</tr>
<tr>
<td>15. Use of oral contraceptives (birth control pills)</td>
<td>13</td>
<td>134 (91.20)</td>
</tr>
</tbody>
</table>
Health Beliefs

Health beliefs were measured under the sub dimensions of perceived threat: perceived susceptibility and perceived seriousness. For susceptibility, measured by nine items on the Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al., 2004) the mean score was 26.11 (SD = 4.64) out of a possible 45, and ranged between 18 to 44. Table 4 represents the frequency and percentage of responses for each item for susceptibility in the questionnaire. More than 50% of women in this age group reportedly worry about getting cervical cancer, however just over 32% are concerned about being infected with HPV. Furthermore, only 23% consider themselves at risk for developing cervical cancer, while a mere 13% perceive themselves at risk of acquiring HPV. Over 62% of the women reportedly believe that they have the ability to avoid getting a HPV infection, with another 50% believing that they can control whether or not they get cervical cancer.
Table 4

Frequencies of Susceptibility Responses in Women Aged 40 – 70.

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question</th>
<th>Strongly Disagree N (%)</th>
<th>Disagree N (%)</th>
<th>Neutral N (%)</th>
<th>Agree N (%)</th>
<th>Strongly Agree N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>I worry about getting cervical cancer.</td>
<td>16 (10.70)**</td>
<td>25 (16.80)</td>
<td>33 (22.10)</td>
<td>46 (30.90)*</td>
<td>29 (19.50)</td>
</tr>
<tr>
<td>17</td>
<td>I worry about getting HPV.</td>
<td>25 (16.80)</td>
<td>36 (24.20)</td>
<td>40 (26.80)*</td>
<td>28 (18.80)</td>
<td>20 (13.40)**</td>
</tr>
<tr>
<td>18</td>
<td>I believe that I am at risk for developing cervical cancer.</td>
<td>25 (16.80)</td>
<td>46 (30.90)*</td>
<td>41 (27.50)</td>
<td>29 (19.50)</td>
<td>7 (4.70)**</td>
</tr>
<tr>
<td>19</td>
<td>I believe I am at risk for contracting HPV.</td>
<td>34 (22.80)</td>
<td>51 (34.20)*</td>
<td>45 (30.20)</td>
<td>12 (8.10)</td>
<td>7 (4.70)**</td>
</tr>
<tr>
<td>20</td>
<td>All women have an equal chance of developing cervical cancer, it is beyond my control.</td>
<td>29 (19.50)</td>
<td>42 (28.20)*</td>
<td>27 (18.10)</td>
<td>39 (26.20)</td>
<td>12 (8.10)**</td>
</tr>
<tr>
<td>21</td>
<td>My chances of getting HPV are high.</td>
<td>34 (22.80)</td>
<td>56 (37.60)*</td>
<td>43 (28.90)</td>
<td>10 (6.70)</td>
<td>5 (3.40)**</td>
</tr>
<tr>
<td>22</td>
<td>My chances of getting HPV are low.</td>
<td>7 (4.70)**</td>
<td>26 (17.40)</td>
<td>39 (26.20)</td>
<td>45 (30.20)*</td>
<td>31 (20.80)</td>
</tr>
<tr>
<td>23</td>
<td>I have the ability to avoid cervical cancer.</td>
<td>7 (4.70)**</td>
<td>37 (24.80)</td>
<td>36 (24.30)</td>
<td>45 (30.20)*</td>
<td>24 (16.10)</td>
</tr>
<tr>
<td>24</td>
<td>I have the ability to avoid HPV infection.</td>
<td>9 (6.0)**</td>
<td>20 (13.40)</td>
<td>26 (17.40)</td>
<td>60 (40.30)*</td>
<td>33 (22.10)</td>
</tr>
</tbody>
</table>

*Maximum response  ** Minimum response
Similarly, mean score for seriousness, measured by six items from the health belief subscale from the same instrument was 19.73 ($SD = 2.87$). Scores ranged between 13 and 29. Details of frequencies and percentage responses for items measuring seriousness is presented in Table 5. Approximately 33% of women view cervical cancer as the most serious disease they could possibly acquire and one that is life threatening. Not surprisingly, over 60% incorrectly believe that HPV is curable.
Table 5

Frequencies of Seriousness Responses in Women Aged 40 – 70

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Question</th>
<th>Strongly Disagree N (%)</th>
<th>Disagree N (%)</th>
<th>Neutral N (%)</th>
<th>Agree N (%)</th>
<th>Strongly Agree N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>All women who develop cervical cancer must have their uterus removed.</td>
<td>31 (20.80)</td>
<td>56 (37.60)*</td>
<td>41 (27.50)</td>
<td>15 (10.10)</td>
<td>3 (2.0)**</td>
</tr>
<tr>
<td>26</td>
<td>Among the diseases that I can imagine getting, cancer of the cervix is the most serious.</td>
<td>24 (16.10)</td>
<td>55 (36.90)*</td>
<td>21 (14.10)</td>
<td>32 (21.50)</td>
<td>16 (10.70)**</td>
</tr>
<tr>
<td>27</td>
<td>I believe HPV is curable with proper medical treatment.</td>
<td>10 (6.70)**</td>
<td>16 (10.70)</td>
<td>32 (21.50)</td>
<td>73 (49.0)*</td>
<td>17 (11.40)</td>
</tr>
<tr>
<td>28</td>
<td>Cervical cancer is often curable with early detection and proper medical treatment.</td>
<td>1 (.70)**</td>
<td>9 (6.00)</td>
<td>17 (11.40)</td>
<td>80 (53.70)*</td>
<td>42 (28.20)</td>
</tr>
<tr>
<td>29</td>
<td>HPV is a life threatening disease.</td>
<td>7 (4.70)**</td>
<td>52 (34.90)*</td>
<td>38 (25.50)</td>
<td>32 (21.50)</td>
<td>18 (12.1)</td>
</tr>
<tr>
<td>30</td>
<td>No one dies anymore from cervical cancer.</td>
<td>49 (32.90)</td>
<td>62 (41.60)*</td>
<td>21 (14.10)</td>
<td>12 (8.10)</td>
<td>4 (2.70)**</td>
</tr>
</tbody>
</table>

*Maximum response  ** Minimum response
To further understand the characteristics of the older women in the group, they were classified into three subgroups by age: 40 - 50, 51 – 60, and 61 - 70 years and compared for differences in knowledge and health beliefs (susceptibility and seriousness). Following tests for normal distribution and homogeneity of variance of the dependent variables, a one way Analysis of Variance (ANOVA) was performed to assess differences between the three subgroups. The null hypothesis was that there is no difference in knowledge, susceptibility, and seriousness among the three subgroups of women in the 40 - 70 age range. Table 6 presents the mean (SD) for knowledge, susceptibility, and seriousness and the results from the ANOVA. Significant differences were noted in seriousness scores only, $F(2,146) = 4.14, p = 0.018$; but not in knowledge, $F(2,146) = 0.634, p = 0.532$; and susceptibility, $F(2,146) = 2.92, p = 0.057$. 
Table 6


<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Knowledge Mean (SD)</th>
<th>Susceptibility Mean (SD)</th>
<th>Seriousness Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50 years</td>
<td>73</td>
<td>7.27 (3.31)</td>
<td>27.01 (4.58)</td>
<td>19.81 (2.92)</td>
</tr>
<tr>
<td>51-60 years</td>
<td>58</td>
<td>7.74 (3.62)</td>
<td>25.38 (4.36)</td>
<td>20.17 (2.60)</td>
</tr>
<tr>
<td>61-70 years</td>
<td>18</td>
<td>6.77 (3.28)</td>
<td>24.77 (5.24)</td>
<td>18.00 (3.05)</td>
</tr>
</tbody>
</table>

*p < 0.05
Post hoc analysis using the Bonferroni adjustment revealed that the 61 - 70 years age group had significantly less perception of seriousness compared to the 51 - 60 year ($p = 0.015$) and 40 - 50 year old groups ($p = 0.048$) (Table 7).
Table 7


<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>40-50 yrs</th>
<th>51-60 years</th>
<th>61-70 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-50 years</td>
<td>73</td>
<td>19.81 (2.92)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P values</td>
<td></td>
<td>p = 1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-60 years</td>
<td>58</td>
<td>20.17 (2.60)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P values</td>
<td></td>
<td></td>
<td>p = 0.048*</td>
<td></td>
</tr>
<tr>
<td>61-70 years</td>
<td>18</td>
<td>18.00 (3.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P values</td>
<td></td>
<td></td>
<td></td>
<td>p &lt; 0.05*</td>
</tr>
</tbody>
</table>

*p < 0.05*
Preventative Practice behavior was profiled using six questions. A summary of frequencies for responses to each question is presented in Table 8 under Group B.
### Table 8

Comparison of Frequency and Percentage of Participant Responses to Preventative Practices Between Women Aged 19 - 26 Years and 40 - 70 Years.

<table>
<thead>
<tr>
<th>Preventative Practices</th>
<th>Total Sample (N=280)</th>
<th>Group A (age 19 - 26) N=131</th>
<th>Group B (age 40 - 70) N=149</th>
<th>Significance (p≤ 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sexual Experience: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently Involved</td>
<td>200 (71.70)</td>
<td>100 (76.30)</td>
<td>100 (67.10)</td>
<td>p = 0.16</td>
</tr>
<tr>
<td>Not currently involved</td>
<td>74(26.5)</td>
<td>28 (21.40)</td>
<td>46(30.80)</td>
<td></td>
</tr>
<tr>
<td>Never had sexual intercourse</td>
<td>5(1.80)</td>
<td>3 (2.30)</td>
<td>2 (1.40)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1(0.30)</td>
<td>0</td>
<td>1 (0.70)</td>
<td></td>
</tr>
<tr>
<td><strong>Use of Condoms: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>p = 0.002</td>
</tr>
<tr>
<td>Always</td>
<td>29 (10.35)</td>
<td>18 (13.70)</td>
<td>11 (7.40)</td>
<td></td>
</tr>
<tr>
<td>Usually</td>
<td>42 (15.00)</td>
<td>26 (19.80)</td>
<td>16 (10.70)</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>29 (10.35)</td>
<td>14 (10.70)</td>
<td>15 (10.10)</td>
<td></td>
</tr>
<tr>
<td>Occasionally</td>
<td>13 (4.60)</td>
<td>6 (4.70)</td>
<td>7 (4.70)</td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>30 (10.80)</td>
<td>19 (14.50)</td>
<td>11 (7.40)</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>131 (46.80)</td>
<td>44 (33.60)</td>
<td>87(58.40)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>6 (2.10)</td>
<td>4 (3.00)</td>
<td>2 (1.30)</td>
<td></td>
</tr>
<tr>
<td><strong>Use of Oral Contraceptives: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Yes</td>
<td>76 (27.30)</td>
<td>57 (43.50)</td>
<td>19 (12.80)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>199(71.00)</td>
<td>73 (55.70)</td>
<td>126 (84.50)</td>
<td></td>
</tr>
<tr>
<td>Don’t Know</td>
<td>1(0.30)</td>
<td>0</td>
<td>1 (0.70)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>4 (1.40)</td>
<td>1 (0.80)</td>
<td>3 (2.00)</td>
<td></td>
</tr>
<tr>
<td><strong>Cigarette Smoking: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>p = 1.00</td>
</tr>
<tr>
<td>Yes</td>
<td>57 (20.40)</td>
<td>27 (20.60)</td>
<td>30 (20.10)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>222 (79.60)</td>
<td>104 (79.40)</td>
<td>118 (79.20)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>1 (0.30)</td>
<td>0</td>
<td>1 (0.70)</td>
<td></td>
</tr>
<tr>
<td><strong>Pap Smear: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>p = 0.05</td>
</tr>
<tr>
<td>Never</td>
<td>8 (2.90)</td>
<td>6 (4.60)</td>
<td>2 (1.40)</td>
<td></td>
</tr>
<tr>
<td>Within the past year</td>
<td>194 (69.70)</td>
<td>97 (74)</td>
<td>97 (65.10)</td>
<td></td>
</tr>
<tr>
<td>Had one but not within past year</td>
<td>75 (27.10)</td>
<td>28 (21.40)</td>
<td>47 (31.50)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>3 (0.90)</td>
<td>0</td>
<td>3 (2.00)</td>
<td></td>
</tr>
<tr>
<td><strong>Family Member Diagnosed with HPV: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td>p = 0.05</td>
</tr>
<tr>
<td>Yes</td>
<td>50(17.90)</td>
<td>28 (21.40)</td>
<td>22 (14.80)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>185(66.10)</td>
<td>77 (58.80)</td>
<td>108(72.50)</td>
<td></td>
</tr>
<tr>
<td>Don’t Know</td>
<td>39(13.90)</td>
<td>23 (17.50)</td>
<td>16 (10.70)</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>6 (2.10)</td>
<td>3 (2.30)</td>
<td>3 (2.00)</td>
<td></td>
</tr>
</tbody>
</table>
A majority of the women (67.10%) reported being active in a sexual relationship at the time of participation. The use of condoms was not high in this group, with 58.40% of the women report never using condoms. In addition, 84.50% of the women also reveal that they do not use any oral contraceptives. The majority of women (79.20%) polled in this group were non-smokers with only 65.10% of them receiving a pap smear test within the past year. Finally, almost three out of every four women answered that they were unaware of a family member who had been previously diagnosed with HPV or cervical cancer. Figures 5 and 6 depict preventative practices for the three subgroups (40 – 50, 51 – 60, and 61 – 70 years) within the 40 - 70 age group.
Figure 5. Sexual experience in women 40 - 70 years of age

Sexual Experience - Women aged 40-70 years

<table>
<thead>
<tr>
<th>Category</th>
<th>40-50 yrs</th>
<th>51-60 yrs</th>
<th>61-70 yrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently Involved</td>
<td>56</td>
<td>33</td>
<td>11</td>
</tr>
<tr>
<td>Not Currently involved</td>
<td>17</td>
<td>22</td>
<td>7</td>
</tr>
<tr>
<td>Never had sexual intercourse</td>
<td>2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sexual Involvement: As evident in Figure 5, sexual involvement progressively diminishes as women age.

Condom Use: Few women in the subgroups aged 51-60 (68%) and 61-70 (83%) use condoms during sexual activity. However, 54% of women in the subgroup 40-50 year olds reportedly use condoms at some point during sexual activity as shown in Figure 5. As women age, the pattern of condom use progressively declines. A higher percentage of women in the ages 40-50 years reported using condoms always, usually, sometimes, or occasionally.
Figure 6. Condom use in women 40 - 70 years of age
Oral Contraceptive Use: The majority of women in all subgroups do not use oral contraceptives; however as demonstrated in Table 9, some use was evident by the women in the 40 - 50 age group. Interestingly, contrary to common practice, one woman in the 60 - 70 age groups reported using oral contraceptives.

Cigarette Smoking: Smoking distribution was similar for the three subgroups. As reported in Table 9, the majority of women were non smokers regardless of age.

Pap Smear: Almost two thirds of the women in each subgroup received a pap smear within the last year.

Family History: Similar response patterns were noted in all three subgroups with very few women reported being aware of a family member’s diagnosis of HPV or cervical cancer.
Table 9

Frequency and Percentage of Participant Responses to Preventative Practices Separated by Groups (40 - 50, 51 - 60, and 61 - 70 Years of Age).

<table>
<thead>
<tr>
<th>Preventative Practices</th>
<th>Group 1 (age 40-50)</th>
<th>Group 2 (age 51-60)</th>
<th>Group 3 (age 61-70)</th>
<th>Significance (p ≤ 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=73</td>
<td>N=58</td>
<td>N=18</td>
<td></td>
</tr>
<tr>
<td><strong>Sexual Experience: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Currently Involved</td>
<td>56 (76.71)</td>
<td>33 (56.89)</td>
<td>11 (61.11)</td>
<td></td>
</tr>
<tr>
<td>Not currently involved</td>
<td>17 (23.28)</td>
<td>22 (37.93)</td>
<td>7 (38.88)</td>
<td></td>
</tr>
<tr>
<td>Never had sexual intercourse</td>
<td>0</td>
<td>2 (3.44)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Use of Condoms: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>7 (9.58)</td>
<td>4 (6.89)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Usually</td>
<td>11 (15.06)</td>
<td>5 (8.62)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sometimes</td>
<td>11 (15.06)</td>
<td>4 (6.89)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Occasionally</td>
<td>6 (8.21)</td>
<td>0</td>
<td>1 (5.55)</td>
<td></td>
</tr>
<tr>
<td>Rarely</td>
<td>4 (5.47)</td>
<td>5 (8.62)</td>
<td>2 (11.11)</td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>33 (45.20)</td>
<td>39 (67.24)</td>
<td>15 (83.33)</td>
<td></td>
</tr>
<tr>
<td><strong>Use of Oral Contraceptives: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17 (23.28)</td>
<td>1 (1.72)</td>
<td>1 (5.55)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>53 (72.60)</td>
<td>56 (96.55)</td>
<td>17 (94.44)</td>
<td></td>
</tr>
<tr>
<td>Don’t Know</td>
<td>1 (1.36)</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Cigarette Smoking: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17 (23.20)</td>
<td>9 (15.51)</td>
<td>4 (22.22)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>56 (76.71)</td>
<td>48 (82.75)</td>
<td>14 (77.77)</td>
<td></td>
</tr>
<tr>
<td><strong>Pap Smear: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>1 (1.36)</td>
<td>1 (1.72)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Within the past year</td>
<td>49 (67.12)</td>
<td>36 (62.06)</td>
<td>12 (66.66)</td>
<td></td>
</tr>
<tr>
<td>Had one but not within past year</td>
<td>22 (30.13)</td>
<td>19 (32.75)</td>
<td>6 (33.33)</td>
<td></td>
</tr>
<tr>
<td><strong>Family Member Diagnosed with HPV: n (%)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>14 (19.17)</td>
<td>7 (12.06)</td>
<td>1 (5.55)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>52 (71.23)</td>
<td>43 (74.13)</td>
<td>13 (72.22)</td>
<td></td>
</tr>
<tr>
<td>Don’t Know</td>
<td>7 (9.58)</td>
<td>5 (8.62)</td>
<td>4 (22.22)</td>
<td></td>
</tr>
</tbody>
</table>

*Sample size for some values do not total 280 because of missing data. Percentages were calculated based on available data for each valuable*
A Pearson Product-Moment correlation coefficient (r) among knowledge and health beliefs (susceptibility and seriousness) showed little (r = 0.06) to fair (r = 0.38) positive relationship between knowledge, susceptibility and seriousness (Table 10) for women aged 40 - 70 years (Portney & Watkins, 2009). Of these, the relationship was significant between knowledge and seriousness only (r = 0.38, p = < 0.001).
Table 10

*Pearson Correlations Between Scores of Knowledge, Susceptibility and Seriousness for the Women Aged 40 - 70 Years Old.*

<table>
<thead>
<tr>
<th>Variable (N = 149)</th>
<th>Mean (SD)</th>
<th>Knowledge</th>
<th>Susceptibility</th>
<th>Seriousness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>7.40 (3.42)</td>
<td>--</td>
<td>.06</td>
<td>.38**</td>
</tr>
<tr>
<td>Susceptibility</td>
<td>26.10 (4.64)</td>
<td>--</td>
<td>--</td>
<td>.15</td>
</tr>
<tr>
<td>Seriousness</td>
<td>19.73 (2.87)</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

*p < 0.001**
**Research Question 2:** Compare the HPV/cervical cancer knowledge, health beliefs and preventative practices in two age groups of women: women aged 19 - 26 and women aged 40 - 70 years. The null hypothesis was that there will be no differences between knowledge, health beliefs, and preventative practices in women aged 19 - 26 and women aged 40 - 70. The research hypothesis was that women aged 40 - 70 years have less knowledge, perceive themselves to be less susceptible and serious and have lower usage of preventative practices regarding HPV and cervical cancer compared to women aged 19 - 26 years.

Research Question 2 was answered by performing an independent t test to assess if there were statistically significant differences in knowledge and health beliefs (susceptibility and seriousness) between the younger group (19 - 26) and the older group (40 - 70) of women. Results revealed that the groups were significantly different for knowledge, \( t(277.55) = 3.00, p = 0.003 \), and susceptibility, \( t(227.33) = 4.21, p < 0.001 \), but not for seriousness, \( t(274.92) = 1.67, p = 0.10 \).

As evident from the socio-demographic differences presented in Table 1 and previously discussed, the two groups were significantly different in marital status, type of religion and level of income. In addition, according to the Health Belief Model (HBM), knowledge, susceptibility, and seriousness can have confounding effects on each other and should be controlled for appropriately.
The dependant variables in this study (knowledge, susceptibility, and seriousness) are also sub dimensions of the HBM. Race and type of insurance, although not significant, were extremely close to exhibiting a significant difference between the two groups. In order to eliminate the confounding effects of socio-demographic characteristics, an Analysis of Covariance (ANCOVA) was performed. The ANCOVA was used to assess whether women aged 19 - 26 years have a higher level of HPV/cervical cancer knowledge and health beliefs compared to women aged 40 - 70 years after controlling for differences in socio-demographic characteristics of education, race, income, religion, and type of health insurance, as well as the effect of the remaining sub dimensions (e.g. control for confounding effects of knowledge and susceptibility when testing for seriousness).

Table 11 represents both unadjusted and adjusted means and variance (SD) for knowledge, susceptibility, and seriousness for the two groups. Prior to the analysis the data was checked and met the following assumptions, a) independence of observation, b) normal distribution of the dependent variables knowledge, susceptibility and seriousness, c) homogeneity of variance, and d) linear relationship between the covariates and the dependent variables. Results indicate that after controlling for all the socio-demographic characteristics and pertinent sub dimensions, there was a significant difference between the groups.
for knowledge only, $F(1, 265) = 6.80$, $p = 0.010$, but not for susceptibility $F(1, 265) = 2.55$, $p = 0.111$, and seriousness, $F(1, 265) = 1.24$, $p = 0.226$. As evident in Table 11, the differences in adjusted means for knowledge are similar after controlling for socio-demographic characteristics and sub dimensions while that of susceptibility and seriousness are lower.
Table 11

Adjusted and Unadjusted Mean (SD) for Knowledge, Susceptibility and Seriousness for Younger and Older Groups of Women Using Socio-Demographics as a Covariate.

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th></th>
<th>Adjusted*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean (SD)</td>
<td>p value</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Knowledge</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>129</td>
<td>8.57 (3.14)</td>
<td>0.003**</td>
<td>8.57 (3.41)</td>
</tr>
<tr>
<td>(19 - 26 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>146</td>
<td>7.44 (3.41)</td>
<td></td>
<td>7.43 (3.38)</td>
</tr>
<tr>
<td>(40 - 70 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Susceptibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>129</td>
<td>29.09 (6.53)</td>
<td>&lt;0.001**</td>
<td>28.12 (4.63)</td>
</tr>
<tr>
<td>(19 - 26 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>146</td>
<td>26.03 (4.63)</td>
<td></td>
<td>26.88 (5.88)</td>
</tr>
<tr>
<td>(40 - 70 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seriousness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group A</td>
<td>129</td>
<td>20.26 (2.76)</td>
<td>0.097</td>
<td>20.19 (3.02)</td>
</tr>
<tr>
<td>(19 - 26 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>146</td>
<td>19.69 (2.78)</td>
<td></td>
<td>19.76 (2.98)</td>
</tr>
<tr>
<td>(40 - 70 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Adjusted means are based on ANCOVA analyses with the following covariates: Race, Education, Marital Status, Religion, Income, and Health Belief Model Sub Dimensions.

** p < 0.05 the p values for the unadjusted means are calculated for the t test and the p values for the adjusted means are calculated for the ANCOVA.
It should be noted that the younger cohort of women have a higher level of knowledge and health belief scores compared to older women. Moreover, the ANCOVA revealed that the socio-demographic covariates race and education led to significant difference in knowledge. Based on this finding, knowledge levels for different race and education levels were plotted in separate graphs (Figures 7 & 8).
Figure 7. Means of knowledge for different races of entire study population
Figure 8. Means of knowledge for educational level of all study participants
A Chi-square test was performed to assess whether there were significant
differences in preventative practice behaviors between the two groups. The
Fisher’s Exact test was used in place of a Chi-square analysis when the
assumption of expected count greater than 5 in each cell was not met. Results
from the analysis revealed significant differences between the groups for “Use of
Condoms”, \( \chi^2(5, N = 274) = 19.07, p < 0.002 \); “Oral Contraceptives”, \( \chi^2(2, N = 276) = 33.84, p < 0.001 \); “Pap-smear Test”, \( \chi^2(2, N = 277) = 5.90, p < 0.048 \); and “Family
Member Diagnosed with HPV” \( \chi^2(2, N = 274) = 5.98, p < 0.05 \); but not for
“Cigarette Smoking”, \( \chi^2(1, N = 279) = 0.005, p = 1.00 \); and “Sexual Involvement”,
\( \chi^2(2, N = 279) = 3.61, p = 0.164 \) (Table 8). While 34.70% of the women in the
younger age group (Group A) reported using condoms regularly (usually and
always), only 18.40% of the women in the older age group (Group B) reported
doing so. The use of condoms was low in the older age group with 59.20% of the
women never using a condom during sexual activities, compared to only 34.60%
in the younger age group. Almost half the women in the younger group (43.80%)
reported using oral contraceptives. In contrast, more women in the older age
group (86.30%) did not use oral contraceptives at the time of participation. In
response to the question whether the women knew anyone in the family with a
history of HPV/cervical cancer, a higher percentage (72.50%) of women in the
older age group reported not knowing one compared to the younger age group (58.80%).

Internal Validity and Reliability

This section presents the internal validity and internal consistency reliability of the overall questionnaire and its subscales. Internal consistency is a reflection of the correlation among subscale items and the correlation of each individual item with the total score (Portney & Watkins, 2009). The reliability coefficient (Cronbach’s Alpha) for the “Awareness of HPV and Cervical Cancer Questionnaire” instrument utilizing the items associated with the subscales of knowledge, susceptibility and seriousness were calculated to determine the internal consistency of the items. The coefficient score can be between 0.00 and 1.00. Cronbach’s alpha for the overall “Awareness of HPV and Cervical Cancer Questionnaire” and its subscales demonstrated good reliability for the overall tool ($\alpha = 0.69$), Knowledge ($\alpha = 0.77$), and for Susceptibility ($\alpha = 0.66$), however Seriousness had poor internal reliability ($\alpha = 0.20$) (Portney & Watkins, 2009). In an effort to check for content validity, items from knowledge section were compared with open ended questions measuring the same construct of knowledge. However, the responses to the open ended questions were insufficient to perform validity analysis.
CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to describe the level of cervical cancer/HPV knowledge, health beliefs and type of preventative practices in women aged 40 - 70 years that are considered to be at higher risk of getting cervical cancer. In addition, the study aimed to determine the differences in knowledge, health beliefs and type of preventative practices in older women aged 40 - 70 years when compared to younger counterparts aged 19-26 years that have typically been the target of most national HPV public awareness and prevention programs. This chapter presents the discussion of the important findings from the study.

Research Questions

Research Question 1: Assess HPV/cervical cancer knowledge, health beliefs, and preventative practices in women aged 40 - 70.

As per the results of this study, the group of women aged 40 – 70 years participating in this study demonstrated inadequate knowledge of HPV and cervical cancer. Overall, they responded incorrectly to more than half the questions regarding knowledge of cervical cancer/HPV on the questionnaire developed by Indeglue et al., (2004), As evident from Table 5 showing the frequency of correct and incorrect responses, many women in this age group exhibited an awareness that HPV is a sexually transmitted disease that could
potentially cause genital warts. They were however unaware of its relationship to cervical cancer, its basic pathophysiology, diagnosis and the clinical manifestations from the disease. Much of the knowledge associating HPV with cervical cancer has evolved within the past decade. Consequently, women in this age group did not receive current HPV and cervical cancer information linking the two during their sexual education classes twenty to thirty years ago (Koutsky, et al., 2002; Munoz, et al., 2002; Munoz, et al., 2003). Not surprisingly therefore, these women are unable to make the connection between HPV, a virus that can cause genital warts and an infection that can potentially lead to cervical cancer. Moreover, despite the extensive public educational campaigns through media and educational websites sponsored by reputable health organizations such as the CDC and the FDA, and major international pharmaceutical companies over the past five years, women aged 40 – 70 continue to possess an inadequate knowledge base regarding HPV and cervical cancer compared to women from the original, historical study (Ingledue et al, 2004).

Numerous recent studies that examined public knowledge of HPV and its link to cervical cancer concluded that public awareness of HPV remains very low (CDC, 2006; Freidman & Shepeard, 2006; National Association of Nurse Practitioners in Women’s Health, 2009; Sherris et al., 2006; Vanslyke, Baum, Plaza, Otero & Wheeler, 2008) The most recent survey from the NPWH (2009)
suggests that women still do not have a clear understanding about the relationship between HPV and cervical cancer. Lastly, health educators and health practitioners have been unsuccessful in providing these women a sound knowledge base to understand that HPV is both a sexually transmitted disease and cancer causing virus.

Knowledge

Knowledge of risk factors for acquiring HPV and cervical cancer was assessed in women aged 40 - 70. As evident from the responses summarized in Table 3, over half of the respondents in this age group were able to correctly identify risk factors of cervical cancer that are associated with sexual behavior and sexually transmitted diseases (multiple sex partners, having STDS, having genital warts, and sexual intercourse before age 18). Perhaps, women are able to make a connection between their sexual behavior and malignancy of the female reproductive organs. However, these women were unable to identify non reproductive system risk factors for cervical cancer (cigarette smoking, use of illegal drugs, and use of oral contraception). It is not surprising that as a group, the women who demonstrated poor knowledge of the pathophysiology of HPV and cervical cancer did not recognize less genitally associated risk factors.

According to Marlow, Waller, and Wardle (2009), among the general public, few women are aware that a sexually transmitted infection causes cervical cancer.
Women aged 40 - 70 in this study have a general understanding of HPV as a STD but they do not possess the depth and breadth of knowledge required to associate HPV with cervical cancer.

*Health Beliefs*

*Perceived Susceptibility*

Individuals have a general medical fear of disease and cancer. Women aged 40 – 70 polled in this study reported being worried about getting cervical cancer, but did not perceive themselves at risk for the disease. This questionnaire was filled out by women while waiting for an annual well woman exam in the gynecologist’s office. Perhaps, it is possible that these women believe that their primary prevention against female reproductive related cancer is to be diligent with health care appointments. These women view this as fulfilling their portion of responsibility for their health and transfer their trust into the hands of their health care provider and are receiving regular pap smears, perhaps with a naiveté to the specific nature and reasons for the visit. Thus, they do not perceive themselves at risk and feel that they have the ability to avoid cervical cancer.

The majority of women aged 40 - 70 participating in this study do not worry about either acquiring HPV, nor do they perceive themselves at risk for contracting the virus. Almost 60% of women in this age group are married or living with their significant other and the majority of the group has only one
sexual partner in the last 5 years. As stated previously, this group demonstrated the knowledge that HPV is a sexually transmitted disease and by their choice of lifestyle they do not perceive themselves at risk for getting and STD. For an individual to make an accurate assessment of disease risk, they first need to be aware of relevant risk factors for the disease (Marlow, Waller, and Wardle, 2009). With insufficient knowledge and understanding of the pathophysiology of HPV and cervical cancer these women remain worried about cervical cancer despite the fact that they are not worried about its precursor. In clinical practice, the new technology enables health care providers to appropriately stratify perceived susceptibility to cervical cancer. The current ASCCP guidelines (2006) encourages practitioners to reassure women that they are less susceptible to cervical cancer if they test negative for high risk HPV DNA and to appropriately identify the subset of women in this group who are at an increase susceptibility for cervical cancer.

Perceived Seriousness

Today, women still die from cervical cancer. In fact, over the last two years the incidence of cervical cancer deaths of women in the United States has increased (CDC, 2008). In this study, women overwhelmingly correctly responded that women still die of cervical cancer. They believe that cervical cancer is serious. In addition, these women believe that cervical cancer is curable
with early detection and medical treatment. Conversely, the majority of this group believes that HPV is curable with proper medical treatment and only one third thinks that it is life threatening. Clearly, these results expose the knowledge deficit of this group regarding the relationship between HPV and cervical cancer.

**Preventative Practices**

Generally, the participants in the group exhibited health conscious behavior. The majority of the 40 - 70 year old women has had a pap smear within the last year, do not smoke and are seeing their provider for a well woman annual exam. Regardless of their current martial status, the majority of this group does not use condoms. Condoms serve two basic purposes: pregnancy prevention and protection for STDs, neither of which this population believes themselves at risk. This behavior can be considered age appropriate, and consistent with other published studies concerning condom use and STD prevention in the middle age and older populations (CDC, 2008; Illa, Brickman, Saint-Jean, Echenique, et al., 2008). Regardless, although women aged 40 - 70 are taking strides to live long healthy lives; they do not fully comprehend the necessity to protect against STDs, including HPV.

To further appreciate knowledge, health beliefs (perceived susceptibility and perceived seriousness) and preventative practices in women aged 40 - 70,
these women were divided into age groups by decade: 40 - 50, 51 - 60, and 61 – 70 years. After analysis, knowledge level and perceived susceptibility remain similar despite the subgroup division. Perception of serious of cervical cancer however, as demonstrated in Table 6 declines after the age of 60. The fear of cervical cancer diminishes as women age possibly as a result of their personal knowledge and association of other age related diseases of a much higher incidence such as heart disease, lung cancer, and breast cancer (ACS, 2007).

In respect to preventative practices, as women get older, they experience age appropriate changes: they are generally less sexually active and do not use or need oral contraceptives. This researcher believes that the decline in condom use in this group of women as they age is related to the physiologic reality that they are no longer at risk for pregnancy and as previously discussed they do not believe that they are at risk for STDs. Lindau and colleagues’ (2007) study of older women (57 - 85 years) results agreed that sexual activity declined with age, and those who reported being sexually active were more likely to be in a relationship.

Extrapolating from the theories suggested by the HBM, the likelihood that an individual will take action to prevent illness depends on the person’s perception that they are personally vulnerable to the condition, the consequences of the condition would be serious, the precautionary behavior effectively
prevents the condition, and the benefits of reducing the threat of the condition exceed the costs of taking action (Redding, Rossi, Rossi, Velicer, & Proschaska, 2000). This study indicates that there is no correlation between HPV/cervical cancer knowledge and perceived susceptibility. From a clinical standpoint, one of the goals of health care practitioners is provide knowledge to patients that it will make a positive impact on their perceived susceptibility, consequently ushering behavioral changes in their lifestyle. Studies show however that perceived susceptibility may also be related to other social, cognitive, psychological factors and medical factors which are apart from knowledge (Deroche, Stephan, Brewer & Le Sanoff, 2007; Kerchaw, Niccolai, Ethu, Lewis, & Ickovics, 2003; Weissman, 2008). The present study also demonstrated a fair positive correlation between knowledge and perceived seriousness. As demonstrated in the results, women in this age group have poor knowledge regarding HPV and cervical cancer and do not perceive cervical cancer to be a serious disease. As knowledge is increased, it is possible that perceived seriousness related to the disease can increase or decrease, or remained unchanged, once again depending on multi-complex factors as described above. In clinical practice providers use experience and interpersonal to help bridge the gap between knowledge and risk reducing behaviors to appropriately affect their patient’s perceived seriousness.
This study shows obvious inconsistencies and gaps in the knowledge, health beliefs and preventative practices regarding HPV and cervical cancer in women aged 40 - 70 and calls for a multidisciplinary, multifaceted, and age appropriate educational campaign regarding HPV and cervical cancer targeted specifically to women in this age group.

**Research Question 2:** Compare the HPV/cervical cancer knowledge, health beliefs and preventative practices in two age groups of women: women aged 19 - 26 and women aged 40 - 70 years.

The results from this study partially support the hypothesis that women aged 40 – 70 have less knowledge regarding HPV and cervical cancer knowledge, perceive themselves less susceptible to its acquisition, perceive HPV and cervical cancer to be less serious than other diseases, and use less preventative practices as compared to women aged 19 – 26. While this study demonstrated that the older age group has less knowledge than the younger group, there were no differences in susceptibility or seriousness between the two groups.

**Knowledge**

Although the existence of HPV has been recognized as a sexually transmitted disease culprit for over half a century, discovery of HPV as a potential cause for cervical cancer that affects women shortly after beginning their first sexual relationship did not emerge until the 1970’s (Moscicki, 2007).
However, as previously stated in the background and significance section, the delineation between the low risk and high risk strains was a breakthrough scientific development less than 10 years ago (Koutsky, et al., 2002; Munoz, et al., 2003; Munoz, et al., 2002). Since then, younger women have been the target public health educational and prevention campaigns as well as vaccination, therefore, it is not surprising that this study indicates that older women have comparatively a lower knowledge level about HPV and cervical cancer than the younger women participants.

Compared to other studies, the findings of this study regarding cervical cancer and HPV knowledge in women aged 19 – 26 are not consistent with previous findings in this population using the same questionnaire (Denny-Smith, Bairan, & Page, 2006; Ingledue et al., 2004). The average knowledge score reported in the study conducted by Indeglue et al (2004) using 428 college women was 6.8 out of 15 while the study by Denny-Smith et al. (2006) reported an average score of 10.2 in women with similar age. The study by Indeglue et al (2004) did not provide sufficient socio-demographic information about their participants, while the study done by Denny-Smith et al. (2006) used 240 undergraduate nursing students with superior knowledge about medical conditions compared to age matched general population. The findings from either study can not therefore be compared to the findings from this study or
generalized to the population. It should be noted that the study by Ingledue, et al. (2004) was performed prior to the massive public educational campaigns to increase awareness in the young adult population. Finally, as suggested from Figures 7 and 8, knowledge scores vary according to individual’s race and education. Caucasians appear to have higher level of knowledge compared to African Americans and other minorities. Furthermore, college graduate women have higher knowledge compared to high school graduates. It is possible that older women that are either African American or other minorities with low education have the lowest knowledge of HPV and cervical cancer and should therefore logically be the prime target of educational interventions involving HPV and cervical cancer awareness.

Health Beliefs (Perceived Susceptibility and Perceived Seriousness)

Contrary to the research hypothesis, this study found no significant differences in perceived susceptibility to HPV and cervical cancer or in perceived seriousness, after controlling for knowledge and socio-demographic characteristics. Prior to controlling for knowledge, the younger group of women had a significantly higher level of perceived risk than women in the older group. The differences in knowledge may therefore be an important mediator between the two groups and their perceived risk.
Preventative Practices

The hypothesis that women aged 40 - 70 would use preventative practices less than women aged 19 - 26 was only partially supported. As previously described, women polled in the older age group reported less sexual partners within the past 5 years and less condom use. In addition, most sexually active women in this age group are in long-term relationships and do not perceive themselves at risk for a STD, nor do they appreciate the connection between HPV and cervical cancer. Younger women however use condoms more, are sexually intimate with more sexual partners, and report a higher incidence of oral contraceptive use than women in the older group. Vanslyke et al’s (2008) qualitative study of 54 women age 18 - 60 reported that women identify three cervical cancer preventative measures: regular annual exams by a health care provider, a pap smear, and having an awareness of changes in one’s own body.

Significance to Advanced Nursing Practice

As a caring profession, nursing is dedicated to the health and wellness of all populations, and is perfectly positioned to act as a catalyst to improve knowledge, health beliefs and preventative practice to ensure optimum health promotion for all women. This study challenges clinical nurse practitioners to reinforce the primary goal of Healthy People 2010 (U.S. Department of Health and Human Services, 2007), to help individuals of all ages increase life
expectancy and improve their quality of life, as well as reduce the number of new cancer cases and the illness, disability, and death caused by cancer. Gaps found through existing literature in women’s understanding about HPV, a potentially deadly virus, suggests the need for more comprehensive education about preventing genital HPV, its possible sequelae, and the significance of pap and HPV screening for cancer detection and prevention of all ages. Knowledge related to HPV, its relationship to cervical cancer, and cervical cancer itself is low in younger and older women. Despite national campaigns to educate young women, knowledge continues to be low. Therefore, practitioners need to empower women with comprehensive knowledge regarding HPV, with a focus tailored to the appropriate needs of their age related population. Through collaborative efforts, it is paramount that the nursing community fully addresses the deficiencies in HPV/cervical cancer knowledge, perceived risk, and preventative practices across the lifespan of both women and men. In addition, information gained through intervention research fosters the development of a multidisciplinary and multifaceted national education campaign designed to educate populations of all socio-demographic backgrounds. Lastly, joining forces to join political action campaigns to reach out to minorities that are the most increase risk of cervical cancer will result in the preservation of human life and the promotion of healthy behavior changes.
Limitations

The findings of this study should be interpreted in light of the several existing limitations. First, given that the participants of this study are mostly residents from an urban area; consequently the findings may not be generalized to other populations.

Secondly, this study relied on self report with no attempt to independently verify respondents’ information. In addition, although this study utilized an anonymous questionnaire, limitations of a survey study may apply: surveys provide only real time descriptions of behaviors and feelings of the respondents and responses cannot always be taken as accurate descriptions of what the respondents actually do or really feel. This is true particularly for behavior that is contrary to generally accepted norms of society, such as information regarding sexual activity (Zia, 2000). Some of these women may have been unwilling to indicate that they have engaged in controversial behaviors, thus skewing the results (social desirability bias).

Scientific advances continue to provide clinicians updated information regarding HPV and cervical cancer. The Awareness of HPV and Cervical Cancer Questionnaire (Ingledue et al., 2004), developed five years ago may not represent this current scientific information. Revision of this tool to reflect scientific
development and cultural beliefs is crucial to gain a better understanding of knowledge, health beliefs and preventive practices in all women.

Lastly, it should be noted that the two groups of women in this study were different in several socio-demographic characteristics. Having groups that are more homogeneous in socio demographic characteristics would make the findings more valid and reliable.

Implications for Future Nursing Research

The findings of this study provide the basis for understanding HPV and cervical cancer knowledge, health beliefs and preventative practices in women of two age groups aged 19 – 26 and 40 – 70 years. However, this study did not investigate age on a continuum throughout a woman’s lifespan. Consequently, the findings are unable to reflect the range of ages when knowledge decreases. The next logical step is to investigate the age threshold where knowledge declines. Furthermore, the tool of this study needs to be refined to reflect current practice patterns and levels of HPV and cervical cancer knowledge. Most importantly, a thorough investigation of the impact of differences in women’s knowledge on their health beliefs and preventative practices in populations with high prevalence and risk of cervical cancer is essential to combating this disease. Finally, identifying deficiencies in the current education campaigns and redesigning culturally sensitive, age appropriate educational awareness and
health promotion will better equip women to win the fight against cervical cancer.

Another vital area of research involves investigating current practice patterns regarding HPV and cervical cancer knowledge in health care providers, specifically nurse practitioners that educate patients about this health condition. New evidence on HPV and cervical cancer is emerging at an explosive pace, and it is challenging for health care providers to stay current with the copious amount of information. Determining the level of HPV and cervical cancer knowledge of care givers will help researchers identify if patients have access to the appropriate information.

Summary

Women aged 40 - 70 have decreased HPV and cervical cancer knowledge when compared to women aged 19 - 26 who have been the target of substantial national educational campaigns. Unlike the younger group of women, women aged 40 – 70 did not have comprehensive sex education during their formative years. Therefore, they did not have the opportunity to make a connection between their sexually activity and their risk of cervical cancer. This initial deficiency is further complicated by the intentional exclusion of women aged 40 and above from the national education campaigns. In addition, this study suggests that the group that has the greatest risk of cervical cancer (African
American women aged 40 - 50 with low education levels) is the same group that health care providers have failed to educate the most. Until further research is completed and age appropriate educational materials are developed, it is crucial that health care providers increase HPV and cervical awareness for all women regardless of their age and hopefully enable women to win the battle against this potentially fatal disease.
References


Friedman, A., & Shepeard, H. (2007). Exploring the knowledge, attitudes, beliefs, and communication preferences of the general public regarding HPV:
Findings from CDC focus group research and implications for practice. *Health Education & Behavior*, 34(3), 471-484.


Appendix 1
Letter of support

Hello,
You are welcome to use my survey. Do you need me to email you a copy? If so I can scan it in and send it to you. Just let me know, and when you finish your study I would love to see how the results turn out. If you need anything else please don’t hesitate to ask. Good luck!
Kim Ingledue

From: Kym1223@aol.com
To: kim_ingledue@hotmail.com
Subject: HPV Knowlegde Tool

Dear Ms. Ingledue,
My name is Kymberlee Montgomery. I am a Nurse Practitioner at Drexel University in Women’s Health and I am also doctoral student, also at Drexel. My primary focus is on the knowledge of women over the age of 40 regarding HPV and I am very interested in your study and your tool. I was hoping to obtain your permission to use this tool in a similar study for my dissertation as well as purchase copies of the tool. At your convenience, please let me know if this is feasible. If you would like to discuss this further, please let me know the best time to contact you.

Thank you so very much for your consideration in this matter,
Kym Montgomery
Appendix 2

**Awareness of HPV and Cervical Cancer Questionnaire**

This questionnaire examines women’s knowledge, perceptions and preventative behaviors regarding HPV and cervical cancer. Participation is voluntary. Do NOT write your name on this form. Your answers will be used to calculate a group score and at no time will your individual score be reported in this study. Please answer every question honestly, and please use the “I don’t know” response rather than guessing or leaving a question unanswered.

**Directions:** Please read each statement and circle the answer you think is correct.

1. The virus associated with cervical cancer is transmitted by:
   a. Sexual intercourse
   b. Maternal-fetal transmission
   c. Blood transfusions
   d. Non-living objects
   e. I don’t know

2. Cervical cancer and pre-cancer cells are associated with the presence of:
   a. Epstein-Barr virus
   b. Herpes Virus
   c. Human Papillomavirus (HPV)
   d. Human Immune-deficiency Virus (HIV)
   e. I don’t know

3. Cervical cancer can be diagnosed by:
   a. X-rays
   b. Pap smear test
   c. Blood test
   d. Urine test
   e. I don’t know

4. Prevention of cervical cancer may require:
   a. Delayed onset of sexual activity
   b. Annual Pap test
   c. Use of condoms
   d. All of the above
   e. I don’t know

5. Human Papillomavirus (HPV) can cause:
   a. Vaginal discharge
   b. Genital warts
   c. Itching
d. Burning with urination
c. I don’t know

6. HPV can live in the skin without causing growths or changes.
   a. Yes
   b. No
   c. I don’t know

Please identify which of the following are risk factors of cervical cancer.

7. Multiple sex partners
   a. Yes
   b. No
   c. I don’t know

8. Having genital warts
   a. Yes
   b. No
   c. I don’t know

9. Sexual intercourse before age 18
   a. Yes
   b. No
   c. I don’t know

10. Taking illegal drugs
    a. Yes
    b. No
    c. I don’t know

11. Having contracted any sexually transmitted diseases
    a. Yes
    b. No
    c. I don’t know

12. Smoking cigarettes
    a. Yes
    b. No
    c. I don’t know

13. Poor diet or nutrition
    a. Yes
    b. No
    c. I don’t know
14. Using tampons
   a. Yes
   b. No
   c. I don’t know

15. Use of oral contraceptive (birth control pills)
   a. Yes
   b. No
   c. I don’t know

Please respond to the following questions by circling:
SA = Strongly Agree
A =    Agree
N =    Neutral
D =    Disagree
SD = Strongly Disagree

16. I worry about getting cervical cancer.
    SA   A   N   D   SD

17. I worry about getting the Human Papillomavirus (HPV).
    SA   A   N   D   SD

18. I believe that I am at risk for developing cervical cancer.
    SA   A   N   D   SD

19. I believe I am at risk for contracting HPV.
    SA   A   N   D   SD

20. All women have an equal chance of developing cervical cancer, it is beyond my personal control.
    SA   A   N   D   SD

21. My chances of getting HPV are high.
    SA   A   N   D   SD

22. My chances of contracting HPV are low.
    SA   A   N   D   SD
23. I have the ability to avoid cervical cancer.
   SA A N D SD

24. I have the ability to avoid HPV infection.
   SA A N D SD

25. All women who develop cervical cancer must have their uterus removed.
   SA A N D SD

26. Among the diseases that I can imagine getting, cancer of the cervix is the most serious,
   SA A N D SD

27. I believe HPV is curable with proper medical treatment.
   SA A N D SD

   SA A N D SD

29. HPV is a life threatening disease.
   SA A N D SD

30. No one dies anymore from cervical cancer.
   SA A N D SD

**Please answer the following questions:**

31. What is your sexual experience status?
    a. Currently involved in a sexual relationship.
    b. Have had sexual intercourse but not currently involved in a sexual relationship
    c. Never had sexual intercourse. (Go to question 33)

32. Do you use condoms?
    a. Always (100%)
    b. Usually (76-99%)
    c. Sometimes (51-75%)
33. Do you currently use oral contraceptives?
   a. Yes
   b. No
   c. I don’t know

34. Do you currently smoke cigarettes?
   a. Yes
   b. No
   c. I don’t know

35. When was the last time you had a pap smear?
   a. Never
   b. Within the past year
   c. Have had one, but not in the past year

36. Have you or anyone in your family ever been diagnosed with HPV or cervical cancer?
   a. Yes
   b. No
   c. I don’t know

Demographics: Please answer the following questions.
(All of the answers will remain private).

1. How old are you? _____

2. Which best describes your race?
   a. White (Caucasian/Not Hispanic)
   b. Black (African American/Not Hispanic)
   c. Asian, Hawaiian, or Pacific Islander
   d. Hispanic or Latino
   e. Other

3. Which best describes your level of education?
   a. High school graduate
   b. Some college courses
   c. College graduate
   d. Post-graduate courses
   e. Other
4. What is your marital status?
   a. Single
   b. Married
   c. Widowed
   d. Divorced
   e. Living with significant other
   f. Recognized civil or domestic partnership

5. What is your religious background?
   a. Protestant/Christian
   b. Catholic
   c. Non denominational Christian
   d. Jewish
   e. Muslim
   f. Hinduism
   g. Buddhism
   h. Agnostic/Atheist
   i. None
   j. Other, please specify_________________

6. What is your household income level?
   a. $0-$20,000
   b. $21,000-$40,000
   c. $41,000-$60,000
   d. $61,000-$80,000
   e. $80,000 or more

7. Which best describes your health insurance status?
   a. None
   b. HMO
   c. State provided insurance
   d. Private insurance
   e. Not sure

8. How many sexual partners have you had in the past 5 years? ______

9. Would you consider yourself to be post menopausal (no menstrual period for over one year)? ______ Yes ______NO _______ Not sure

10. Have you ever had a hysterectomy? _____Yes _____No
IF YES PLEASE ANSWER THE FOLLOWING:

a. I have had a complete hysterectomy (removal of all female internal organs)
b. I have had a partial hysterectomy (removal of some of female internal organs)
c. I have had a hysterectomy but I am unsure what was removed.

11. In your own words, what is the Human Papillomavirus?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

12. What would you expect to see if you acquired the Human Papillomavirus?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

13. How do you get the Human Papillomavirus?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

***************THANK YOU FOR YOUR TIME***************

Appendix 3

Recruitment Ad

Advertisement for Recruitment
Kymberlee A. Montgomery, DrNP(c), CRNP
Contact Information: (267)767-7247
Advertisement for Recruitment

**WOMEN WANTED FOR RESEARCH**

**PARTICIPANTS WANTED FOR CONFIDENTIAL SURVEY TO HELP IMPROVE WOMEN’S KNOWLEDGE OF CERVICAL CANCER!**

**WOMEN MUST:**

- BE BETWEEN THE AGES OF 19 - 26 AND 40 - 70
- LIVE IN PHILADELPHIA COUNTY, PA
- BE COMING IN TODAY FOR AN ANNUAL EXAM
- BE WILLING TO FILL OUT AN ANONYMOUS QUESTIONNAIRE

If you are interested in participating or would like more information, please inquire at the front desk.