PREDICTORS OF CHLAMYDIA AND GONORRHEA SCREENING BEHAVIORS AMONG HIGH-RISK YOUNG WOMEN

by

Nadra Chante Tyus

BS, Biological Sciences, Ohio University, 1998

MPH, Medical University of Ohio, 2000

Submitted to the Graduate Faculty of

The Graduate School of Public Health in partial fulfillment

of the requirements for the degree of

Doctor of Public Health

University of Pittsburgh

2005

UNIVERSITY OF PITTSBURGH

Graduate School of Public Health

This dissertation was presented

by

Nadra Chante Tyus

It was defended on

June 30, 2005

and approved by

Dissertation Advisor:
Dr. Jeanette Trauth, Associate Professor
Department of Behavioral and Community Health Sciences
Graduate School of Public Health
University of Pittsburgh

Committee Member:
Dr. Robert Cook, Assistant Professor
School of Medicine
University of Pittsburgh

Committee Member:
Dr. Sandra Quinn, Associate Professor
Department of Behavioral and Community Health Sciences
Graduate School of Public Health
University of Pittsburgh

Committee Member:
Dr. Edmund Ricci, Professor
Director, Institute for Evaluation Science in Community Health
Department of Behavioral and Community Health Sciences
Graduate School of Public Health
University of Pittsburgh

Committee Member:
Dr. Ada Youk, Research Assistant Professor
Department of Biostatistics
Graduate School of Public Health
University of Pittsburgh

Jeanette Trauth, PhD

PREDICTORS OF CHLAMYDIA AND GONORRHEA SCREENING BEHAVIORS AMONG HIGH-RISK YOUNG WOMEN

Nadra C. Tyus, DrPH

University of Pittsburgh, 2005

Sexually transmitted disease (STD) testing among sexually active young women is essential in preventing and controlling the STD epidemic. STD testing is critical because infections such as Chlamydia trachomatis and Neisseria gonorrhoeae are primarily asymptomatic in women. If women do not routinely test for STDs, this can facilitate the spread of these diseases and lead to serious sequelae.

The research presented explores socio-demographic, psychosocial, and health-related factors that may be associated with young women's STD testing behaviors. The Health Belief Model (HBM) provides the theoretical framework for explaining the relationships that exist between background factors, HBM perceptions of STDs and STD testing, and the total number of STD tests completed during the two-year study.

The population studied for this research is a sample of 14 –29 year old women, approximately 80% of whom are African-American. Univariate regression analysis between background factors and the outcome indicated that age, race, education, having symptoms of an STD at baseline, current antibiotic use, and having condom problems were associated with an increasing number of STD tests completed. A similar analysis between HBM perception variables and the outcome showed that only perceived severity was significant. A multivariate stepwise linear regression model of significant background and perception factors revealed that

having symptoms at baseline, current antibiotic use, and having condom problems were significant to an increasing number of total STD tests completed.

These findings demonstrate that an assessment of behaviors and current health status of young women can be helpful in understanding utilization of STD services. The results also suggest that the HBM may not be sufficient in characterizing STD testing behaviors, however, improved measures of these constructs can better assess trends in the data. The public health significance of this study is that it provides theoretical and empirical attention to factors associated with STD testing behaviors, an area of research that has received limited consideration.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENTS

First, I would like to give all honor to God because he is my source of strength and inspiration during this fascinating journey. There were many ups and downs on this road, but trusting in him helped me to stay my path. I want to thank the Lord for all my continued blessings each and every day.

Second, I would like to give thanks to my wonderful dissertation committee. To my committee chair, Dr. Trauth, I appreciate all your assistance and support in allowing me to pursue my passion and for all that you have done. You worked hard for me and I thank you. To Dr. Cook, my mentor, I would like to first thank you for the opportunity to work with you and the use of the DAISY data. You welcomed me from the first time that I met you and you inspired me from then on out. Thank you for everything and I look forward to working with you in the years to come. To Drs. Youk, Quinn, and Ricci, I thank you for bringing all of your expertise to the table and giving me personal insight on how to finish this paper. Dr.Youk, you are truly a wonderful professor and I have enjoyed your assistance on my committee. In addition to my committee, I would like to give special thanks to the DAISY project team who helped me in many ways: Dr. Ness (PI of the study), Kathryn, Debby, Allison). Also, I would like to give a special acknowledgement to Galen Switzer who provided his expert assistance on the factor analyses performed in this paper.

To my wonderful family and friends, I would like to say that I love you and that I appreciate your patience and inspiring words during this time of my life. My mother, father, and brother have been supportive in many ways and I am grateful to have them in my life. I also have my extended family such as my aunts, cousins, and the Redden family (Pamela, Missy, and "the boys") whom I thank for their prayers and love. And to my friends….where do I begin?

Thank you to my life-long friends Angie, Nicole, Arika, Kimberly, Shaunna, and others….I love you. To my friends that I have acquired during my time in school (Lori, Rhonda, Shevon, Wil, Ina, Khaleelah, Rachael, etc.), I thank you all for the laughs and for making this journey that much more wonderful. I would also like to thank my sorority family in Cleveland, Ohio for all their blessings.

Thank you all who have touched my life during my time writing this dissertation. I knew one day that I would achieve something great, but I never knew what it was going to be. I believe this is a wonderful and fulfilling achievement for me. Although, my passion for wanting to help others and for helping women protect themselves has led me to the end of this journey, I will always be on the road to a new one! I love and thank you all.

1. CHAPTER I.

1.1. INTRODUCTION

1.1.1. Statement of the Problem

There are more than 65 million people currently living in the United States with an incurable sexually transmitted disease (STD) (CDC, 2001). In addition, there are approximately fifteen million new cases of STDs every year (KFF, 2003). Of these new cases, approximately two-thirds occur among people under the age of 25 (KFF, 2003). *Chlamydia trachomatis* (Chlamydia) and *Neisseria gonorrhoeae* (Gonorrhea) are curable STDs which are the first and second most commonly reported notifiable diseases, respectively, in the US (CDC, 2003). Although STDs remain widespread, they are still considered to be "hidden" epidemics with tremendous health and economic consequences (IOM, 1997).

The Institute of Medicine (IOM) characterizes STDs in this manner because STDs remain an unspoken phenomenon in public even though they infect all segments of the US population (IOM, 1997). Another reason STDs can be described as hidden may be due to the asymptomatic nature for some of the diseases. Lack of awareness by the general public concerning the risks associated with STDs may cause serious health problems years after infection (IOM, 1997). Additionally, STDs not only lead to long-term health consequences, but they also add billions of dollars to the nation's healthcare costs each year – an estimated $17 billion annually (CDC, 2001; Shafii & Burstein, 2004).

Adolescents and young adults are also at high risk for acquiring an STD (IOM, 1997). According to the CDC, 42 percent of 20 to 24-year-olds and 25 percent of 15 to 19-year-olds account for all newly-reported cases of STDs in the US (KFF, 2003). Factors that have an effect on risk-taking behaviors among adolescents include beliefs of invulnerability and an immature

approach to decision-making (Shafii & Burstein, 2004). In addition, social factors such as poverty, limited STD health care services, older male partners for female adolescents, sexual abuse and violence, and adverse adolescent health-seeking behaviors have been identified as contributing to adolescents' increased susceptibility to STDs (Shafii & Burstein, 2004).

Research also suggests that young women, especially African-American women, suffer disproportionately from STDs. Young women are biologically more susceptible to infection because the cells on their cervix are particularly susceptible to STDs such as Chlamydia and gonorrhea (CDC, 2001; HP, 1999). In addition, the rate of Chlamydia in African-American females in the US was eight times higher than in white females (1,638.3 and 202.5 per 100,000, respectively) (CDC, 2001). Differences in STD prevalence have been attributed to the over-representation of specific racial and ethnic groups receiving care for STDs in the public sector compared to private sources (Shafii & Burstein, 2004). However, the disproportionate impact of STDs among young women and African-American females, reflects the need for improved health outcomes among young women.

Fortunately, Healthy People 2010 has identified the promotion of responsible sexual behaviors, the strengthening of community capacity, and increasing access to quality services to prevent STDs and their complications, as an overall objective for reproductive health (HP, 1999). A major complication of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections is a clinical syndrome named pelvic inflammatory disease (PID). The sequelae of PID can lead to tubal scarring which may result in pelvic pain, infertility, ectopic pregnancy, or even death (Suss, Homel, Hammerschlag, & Bromberg, 2000). Cervical infections which cause PID are also risk factors for HIV transmission (Suss et al., 2000). Thus, diagnosis and proper treatment of

chlamydial and gonococcal infections are essential for improving the reproductive health of our nation.

However, proper diagnosis and treatment of chlamydial and gonorrheal infections in women can only occur if a provider screens them for STDs or if they seek STD testing. Due to the asymptomatic nature of STDs and other patient or provider factors that may impact STD testing, this may be difficult. So, in an attempt to decrease the prevalence of Chlamydia and gonorrhea among women in the US, universal screening recommendations have been made. Research has shown that screening women for *Chlamydia trachomatis* can reduce the incidence of PID by more than 50% in the course of one year (Scholes et al., 1996). The Scholes study and others may have influenced the CDC in 2001 to recommend that sexually-active women under the age of 25 be screened for Chlamydia every six months (USPSTF, 2001). Hence, routine testing of sexually-active women is the most effective way to identify and treat women with Chlamydia (ASHA, 2001). In addition, it is equally important to encourage young women to actively seek STD testing if sexually active.

Issues related to STD testing and screening continue to be critical factors in controlling the STD epidemic. Research that assesses utilization of services for the prevention and treatment of STDs has been noted as a major area of scientific and practical relevance for the prevention and control of STDs (Amaro & Gornemann, 1991). Experts have suggested that understanding patient and provider characteristics as well as psychosocial and environmental factors which may affect STD-healthcare seeking behaviors is an essential tool for reducing sequelae of STDs. Therefore, this exploratory study has been undertaken in order to examine predictors of Chlamydia and gonorrhea screening behaviors among a high-risk group of young women.

1.1.2. Research Questions

The objective of this study is to examine socio-demographic, psychosocial, and health-related predictors of STD testing among high-risk young women. The research questions address the predictors' influence on the outcome variable: total number of STD tests completed during two years of the DAISY (Detection Acceptability Intervention for STDs in Young women) study – a home STD screening intervention study. The following research questions are addressed:

1. What socio-demographic, psychosocial, and health-related [background] variables are associated with the 4 perceptions of STDs (perceived risk, severity, benefits, and barriers)?
2. Are the perceived susceptibility and severity of STDs, the perceived benefits of STD testing, and the perceived barriers to STD testing [perceptions] associated with the number of total STD tests completed?
3. Overall, what background factors and perceptions are associated with the number of total STD tests completed?

These questions have been developed using a modified framework of the Health Belief Model (HBM). This model will be discussed later in Chapter Four.

1.1.3. Significance of the Study

The CDC provides clinical prevention guidelines and bases the prevention and control of STDs on the following strategy: 1) education and counseling of persons at risk on ways to take part in safer sexual behavior; 2) identification of asymptomatically infected persons and of symptomatic persons unlikely to seek diagnostic and treatment services; 3) effective diagnosis and treatment of infected persons; 4) evaluation, treatment, and counseling of sex partners of

persons who are infected with an STD; and 5) pre-exposure vaccination of persons at risk for vaccine-preventable STDs (MMWR, 2002). This research focuses on the second and third strategies. Exploring the predictors of STD testing behaviors can improve access to quality STD services and identify and treat those who are asymptomatic or at increased risk for STDs.

In an effort to increase and improve access to quality services which prevent STDs and their complications, understanding what factors influence individuals to seek or not seek treatment is essential for effective control of STDs (Amaro & Gornemann, 1991). These factors can affect how STD prevention services are provided to specific populations. Additionally, these factors can assist health professionals with detecting and treating individuals who are either asymptomatic or not likely to seek diagnostic and treatment services. The current study has utilized a larger study, the DAISY study, whose aims are to: 1) evaluate the effectiveness of home sampling to increase adherence to routine STD screening (i.e. every 6 months); and, 2) compare the number of lower genital tract Chlamydia infections detected in a home screening and return visit group (recruited from clinic and community populations) in order to determine STD perceptions and socio-demographic, psychosocial, and health-related characteristics of young females in Pittsburgh, PA who are seeking STD healthcare. Thus, a better understanding of factors which influence health-seeking behaviors can ultimately be used to improve access to quality STD services.

The use of a theoretical model to investigate the relationships between predictor and STD outcome variables is essential in explaining the determinants of STD healthcare seeking behavior. This exploratory study is important because it fills some of the research gaps in this subject area. In addition, it may well be the first use of the majority of HBM components to explain STD health-care seeking behaviors among young women. Although individual HBM

constructs (i.e. perceived risk and perceived susceptibility) have been used to characterize certain STD-protective behaviors such as condom use, there is limited literature on how most of the HBM components affect STD testing behaviors. Hence, this study will significantly add to the literature and supply evidence for further exploration of HBM constructs as an explanatory framework for examining this area of public health significance.

In summary, the current study has several significant aspects. It adds to the theoretical understanding of how HBM constructs can be used to investigate STD testing behaviors among high-risk young women. Second, this study investigates whether differences in STD testing behaviors exist between clinic and community populations (i.e. healthcare users vs. non-healthcare users) and between racial groups. Furthermore, there are a number of practical aspects to this study. First, research which sheds light on an understanding of patient characteristics regarding utilization of STD services is urgently needed. Understanding perceptions of susceptibility held by certain populations, their perceived barriers to care, and how norms and/or stigma affect STD testing behaviors is essential to improving STD services to young women. Second, health care providers and public health professionals need to be knowledgeable about the provision of treatment services and provider characteristics which may impede or enhance one's willingness to seek STD testing. Third, in order to improve the detection and treatment of Chlamydia and gonorrhea for prevention of PID and understanding factors related to usage of innovative testing strategies such as home sampling, will be beneficial in reducing the incidence and re-infection of persons with these diseases. Fourth, there are racial disparities that exist in the STD epidemic. This study will attempt to characterize trends in the data that may demonstrate differences in background and risk perceptions which affect STD testing behaviors. Lastly, this study can provide the platform for improving STD prevention

interventions (i.e. developing STD knowledge and counseling sessions with home sampling techniques, improving services to treat partners for these diseases, etc.) that focus on preventing PID among high-risk young women.

2. CHAPTER II.

2.1. REVIEW OF THE LITERATURE

The primary objective of this study is to examine socio-demographic, psychosocial, and health-related predictors of STD testing behaviors among a high-risk group of young women. Previous studies examining the association of factors with STD healthcare-seeking behavior have found that stigma (Fortenberry et al., 2002), inaccurate perceptions of risk (Banikarim, Chacko, Wiemann, & Smith, 2003), and past STD history (DiClemente et al., 2002) have an affect on this behavior. Although these studies provide some understanding of factors that affect utilization of STD services, it is imperative that more attention be placed on researching patient characteristics that impact STD testing behaviors. This information can prove to be beneficial in enhancing STD detection and treatment programs and more effectively reduce the incidence of PID. Additionally, racial disparities in STD rates among women and African-Americans, warrant the need to examine trends in data that may explain why inequities in STD acquisition exist.

This chapter presents a discussion of a) background on Chlamydia and gonorrhea screening/testing and treatment guidelines, b) previous studies conducted that investigate issues related to STD healthcare-seeking, and c) background information related to an understanding of racial disparities in STD rates.

2.1.1. Background on Chlamydia and Gonorrhea Screening & Treatment

Transmission

Chlamydia is a curable sexually transmitted infection (STI) which is caused by the bacteria *Chlamydia trachomatis* (NIAID, 2004). Chlamydia is primarily transmitted during oral, vaginal, or anal sexual contact with an infected partner (NIAID, 2004). The site of initial

infection for Chlamydia is most often the cervix, yet, the urethra and rectum may also be infected (MMWR, 1993).

Gonorrhea is also a curable STI caused by a bacterium called *Neisseria gonorrhoeae* (NIAID, 2002). Gonorrhea is known to infect the genital tract, the mouth, and the rectum (NIAID, 2002). For women, gonorrhea first infects the cervix and can later spread to the uterus and fallopian tubes resulting in PID, if untreated (NIAID, 2002).

In men, the sequelae of chlamydial and gonorrheal infections are rare. Sequelae that may occur in men is called epidydimitis, but the incidence of this condition is much lower than the incidence of PID in women (Burstein & Murray, 2003).

Clinical Manifestations

Genital infections caused by *Chlamydia trachomatis* and *Neisseria gonorrhoeae* closely parallel one another in terms of clinical manifestations (Stamm, 1999). Both organisms usually infect columnar or transitional epithelium of the urethra and extend to the endometrium, salpinx, peritoneum, and the rectum. These infections lead to subepithelial inflammation, epithelial ulceration, and scarring. In rare cases, both organisms produce systemic manifestations (Stamm, 1999).

Most early symptoms of Chlamydia and gonorrhea are considered to be mild. Due to these mild symptoms, many women are unaware that they are infected. For Chlamydia, symptoms may appear within 1 to 3 weeks after being infected. These symptoms include abnormal discharge from the vagina or penis or pain when urinating (NIAID, 2004).

For gonorrhea, symptoms generally appear within 2 to 10 days after sexual contact with an infected partner (NIAID, 2002). In women, initial symptoms may include: bleeding associated with vaginal intercourse, painful or burning sensations when urinating, or vaginal

discharge that is yellow or bloody. Advanced stages of gonorrhea can produce symptoms such as pain, bleeding between periods, vomiting, or fever which may indicate the development of PID (NIAID, 2002).

Diagnosis and Treatment

Nucleic acid amplification tests (NAATs) are the newest diagnostic tests in the detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections (Burstein & Murray, 2003). NAATs are highly sensitive and are specific tests for these infections. There are four tests that are licensed for both Chlamydia and gonorrhea testing and some require only a single specimen for both tests (Burstein & Murray, 2003). Overall, there are five NAATs and they are polymerase chain reaction, ligase chain reaction (no longer available in 2004-2005), strand-displacement amplification, hybrid capture II system, and transcription-mediated amplification. The first four tests, respectively, are the combination tests used to detect both chlamydial and gonorrheal infections (Burstein & Murray, 2003). Most specimens collected for these tests are from cervical swabs, urethral swabs, or first-void urine, however, hybrid capture II system only takes cervical specimens.

NAATs offer many advantages over older methods of diagnosing these infections. The tests are extremely sensitive, have the ability to test urine specimens, and provide the opportunity to test asymptomatic females without an invasive genital examination. For symptomatic patients, a full genital examination is needed to evaluate for PID and other infections that may cause vaginal and urethral discharge (Burstein & Murray, 2003). Therefore, NAATs offer an opportunity to provide a less invasive testing procedure that is highly effective in detecting chlamydial and gonorrheal infections.

Older tests utilized for specifically diagnosing *Chlamydia trachomatis* are cultures, enzyme immunoassay (EIA), and DNA probes. These tests are less sensitive and require cervical or urethral specimens (Burstein & Murray, 2003). Older tests for detecting *Neisseria gonorrhoeae* are cultures, DNA probes, and gram stains. As mentioned earlier for Chlamydia tests, these laboratory tests for gonorrhea are less sensitive and require an invasive genital exam (Burstein & Murray, 2003).

Single dose therapies to treat (not cure) uncomplicated chlamydial and gonorrheal infections are available and they include a class of antibiotics called fluoroquinolones (i.e. ciprofloxacin, ceftriaxone, ofloxacin, and levofloxacin) (Burstein & Murray, 2003). In 2002, the CDC recommended that positive gonorrhea tests among adolescents should be treated for both chlamydial and gonorrheal infections, unless a negative result was obtained for a sensitive Chlamydia test (co-infections often occur among adolescents) (Burstein & Murray, 2003). Single dose azithromycin and doxycycline can also be used to treat *Chlamydia trachomatis*. *Neisseria gonorrhoeae* infections have had resistance to penicillin and tetracycline classes of antibiotics and a single 1-g azithromycin dose has resulted in suboptimal cure rates for gonorrhea (Burstein & Murray, 2003). Moreover, fluoroquinolones are not recommended for persons younger than 18 years of age because they have caused articular cartilage damage in juvenile animal models (Burstein & Murray, 2003). In addition, quinolones are not recommended as treatment for gonorrheal infections in Asia, the Pacific, California, or Hawaii because of reported resistance in these areas (Burstein & Murray, 2003). However, a single injection of ceftriaxone can cure gonorrhea.

Screening Recommendations

Due to the high frequency of asymptomatic chlamydial and gonorrheal infections and their potentially harmful sequelae, screening programs have been created to detect and treat infected women early. Accordingly, universal and selective screening strategies have been recommended by several health service agencies. In 1993, the CDC offered universal screening recommendations that all sexually experienced females be screened for *Chlamydia trachomatis* (Fiscus, Ford, & Miller, 2004). The American Academy of Pediatrics, the US Preventive Services Task Force (USPSTF), and the American Medical Association (AMA) have also made similar recommendations. Moreover, between 1997 and 2000, these agencies expanded their guidelines to screen all sexually active women younger than age 25 for Chlamydia (Chacko, Wiemann, & Smith, 2004; Huppert & Hillard, 2003). In addition to screening recommendations, annual chlamydial screening among sexually-experienced female adolescents is now a quality of care measure in the Health Plan Employer Data and Information Set (HEDIS) which can be used to evaluate screening practices (Fiscus et al., 2004).

Selective screening strategies are alternative methods to universal screening that usually incorporate risk assessments as part of their approach to identifying infected females. These strategies include setting screening criteria based on demographic and behavioral markers, symptoms, and signs (W. Miller et al., 2000). Some of the common risk markers for these criteria are age, number of sexual partners, and physical exam findings such as cervicitis (W. Miller et al., 2000). Selective screening strategies have been widely utilized because universal screening may be too expensive in some settings (W. Miller et al., 2000). Studies of these screening strategies are useful in determining the most effective approach for selecting screening criteria.

Universal and selective screening studies have been beneficial in determining risk factors to use as criteria, recognizing disparities in screening programs and evaluating the effectiveness of screening strategies. An intervention trial conducted by Scholes and researchers (1996) found that at-risk women who were randomized to a screening group versus a usual care group had a 56 percent lower incidence of pelvic inflammatory disease. This population consisted of over 2,600 single women, primarily between the ages of 18 and 24, who were mostly non-Hispanic white (69%) and African-American (21%). The selection of those at-risk for Chlamydia infection were based on a risk score that included age less than or equal to 24, black race, nulligravidity (having no prior pregnancies), douching in the preceding 12 months, and two or more sexual partners in the preceding 12 months. Those in the intervention group were contacted to be tested for Chlamydia while the usual care group were not contacted by the study team for follow-up evaluation (Scholes et al., 1996). Hence, selective screening strategies are useful in detecting Chlamydia infections and may ultimately decrease the incidence of PID among at-risk women.

Selective screening strategies can be difficult to establish because they may be based upon many factors such as the demographics of the population the clinic serves, risk factors among clients, and financial resources. A clinic-based study that evaluated the diagnostic performance of different screening criteria (age alone, 1993 CDC recommendations, and different recommendations from 4 areas – Seattle, Wisconsin, Ontario, and California) concluded that age alone is a reasonable strategy when site-specific criteria cannot be developed either due to financial or clinic constraints (W. Miller et al., 2000). Another study performed by Marrazzo and colleagues (1997) compared three sets of Chlamydia screening recommendations (CDC, Region X Chlamydia project, and age alone). They found that age alone (younger than 25)

performed best even in this low-risk population where only 59 to 71 percent of women had to be screened with sensitivity of detecting Chlamydia at 92 to 94 percent (Marrazzo, Fine, Celum, DeLisle, & Handsfield, 1997). In conclusion, selective screening criteria can be helpful in reducing the proportion of women screened and increasing the number of women diagnosed and treated with chlamydial and gonorrheal infections.

Although selective screening strategies exist there still appears to be a disparity in screening at-risk women for STDs. An examination of the 1988 National Survey of Family Growth revealed that black race and individuals attending family planning clinics were more likely to be tested for STDs, independent of their individual characteristics (Mosher & Aral, 1991). However, among groups with high-risk behaviors in this study, only 34 percent of sexually active teenagers and 43 percent of women with an STD history were screened (Mosher & Aral, 1991). Another study conducted by Ellen, Lane, and McCright (2000) also found that of 118 sexually active African-American adolescents in a low-income neighborhood of San Francisco, only 48 had been screened within the past 12 months for STDs. A low rate of screening was even found among those who had a primary care visit since after their first sexual encounter (Ellen, Lane, & McCright, 2000). Thus, this study demonstrates that family planning clinics may serve as good providers of STD screening services and that screening practices for sexually active individuals are low overall. Additionally, improved targeting strategies should not only include race but be inclusive of females who have high-risk behaviors or a past STD history.

A similar study conducted more recently by Fiscus, Ford, and W.C. Miller (2004) examined Wave 1 of the National Longitudinal Study of Adolescent Health (Add Health). This study reported on factors related to receipt of STD testing and treatment as well as the types of

clinical sites that are commonly used for delivery of care. Results showed that only one in five sexually experienced, adolescent females (grades 7-12, approximately 29% Black and 50% White) in the US are receiving recommended STD screening (Fiscus et al., 2004). Although 66 percent of sexually experienced females reported routine physical examinations, only 22 percent said that received STD testing or treatment and approximately 44 percent had gotten their care from a community health center (Fiscus et al., 2004). In addition, the strongest predictors of screening were older age, being Black, having Medicaid/Medicare, and having had a physical exam in the past year (Fiscus et al., 2004). As a result, these findings suggest that females may be unaware of STD testing that may occur at a routine exam. In addition, there needs to be improved adherence to screening recommendations and more work is needed to ensure that adolescents are encouraged to be more active in being screened for STDs.

Additional studies have also implied that annual screening recommendations may not be the most effective screening interval for some populations. The interval to re-infection and high re-infection rates suggest that multiple versus annual screening may be needed in some populations. A study conducted by Burstein and others (1998) found that among an inner-city population of over 3,000 adolescent females (ages 12-19, 98% African-American), those with at least 2 positive Chlamydia test results had a median time to re-infection of 6.3 months and that 25 percent of the re-infections were discovered within 4 months (Burstein et al., 1998). In a review of Chlamydia screening recommendations performed by Kohl, Markowitz, and Koumans (2003) risk factors for repeat infection appear to be another aspect of Chlamydia and gonorrhea screening strategies that should be further explored. High rates of re-infection may occur due to one or more of the following factors: partner selection patterns, sexual contact with untreated partners, and/or failure of individuals to modify high-risk sexual behaviors (T. Kershaw et al.,

2004). Some recommendations suggest screening women every 6 months or every 3 months for those with an initial infection (Kohl, Markowitz, & Koumans, 2003). Hence, modifications to screening criteria for those at increased risk of Chlamydia and gonorrhea infection may change to every 6 months or so to improve diagnosing and treating these infections.

Similarly, recommendations also suggest that presumptive treatment for Chlamydia is needed when individuals are diagnosed with gonorrhea. In 2002, the CDC renewed their recommendation that presumptive Chlamydia treatment in patients treated for gonorrhea (co-treatment) should be the standard of care (MMWR, 2002). A multi-site study conducted by Lyss and colleagues (2003) in Baltimore, Denver, Long Beach, Newark, and San Francisco found that among 3885 heterosexual men (2184) and women (1701), 19 percent of men (N=411) and 9 percent of women (N=151) had a gonorrhea infection (Lyss et al., 2003). Results indicated that of those infected with gonorrhea, 20 percent of the men and 42 percent of the women also had a Chlamydia infection. The population from which this study is based upon were mostly young (median age, 25 years), members of racial/ethnic groups (59% Black, 16% Hispanic, 20% White, and 6% other. Consequently, not only are individuals, especially women, being re-infected within months of initial infection, but many are also infected with both Chlamydia and gonorrhea. On the other hand, Gift and others (2002) found in a decision analysis with PID as the outcome that testing asymptomatic women for both Chlamydia and gonorrhea infections was more cost-effective than presumptive treatment for *Chlamydia trachomatis*. Accordingly, the need for Chlamydia and gonorrhea prevalence studies and ensuring that co-treatment or testing of both these infections is further researched should improve the standard of care.

Not only are there problems with screening programs, but investigation of STD screening criteria can assist with determining if these programs are effective or not. There are two basic

questions when evaluating the effectiveness of STD screening programs and they are: (1) is the program effective in reducing the prevalence/incidence of disease complications; and (2) can benefits be obtained at a reasonable cost? (W. Miller, 1998). Using a model that incorporates the relationship of clinic prevalence, a risk score based on risk assessment, and the probability of infection, Dr. William Miller discovered that prevalence-based chlamydial screening programs would be effective for clinics or areas with limited resources (W. Miller, 1998). However, Miller does suggest that universal screening for screening programs without financial constraints should remain the gold standard for STD care.

Another look at the review performed by Kohl and others (2003) found cost-effectiveness studies in Chlamydia screening programs to be scarce. Yet, some findings in this study revealed that universal screening was more cost-effective than no screening and that selective screening based on age (less than or equal to 25 years and less than 30 years) was more cost-effective than universal screening (Kohl et al., 2003). These findings were highly dependent on the prevalence of Chlamydia in the population, risk factor prevalence, and testing procedure used. Moreover, Howell and researchers (1998) found that age-based screening provided the most cost-effective screening strategy within a family planning clinic in Baltimore, Maryland (Howell, Quinn, & Gaydos, 1998). Thus, understanding a program's effectiveness will also be essential in determining which STD screening criteria are best for specific testing facilities (public, private, etc.).

In conclusion, screening recommendations are essential to identifying asymptomatic and symptomatic infected individuals. Many of the studies demonstrate that universal screening recommendations are needed in some populations, but other settings may need to determine the best criteria for their facility in developing guidelines for Chlamydia and gonorrhea screening.

The same may be true regarding methods for which clinics or doctors' offices provide treatment for these infections and whether presumptive treatment is standard for these facilities. Overall, STD screening recommendations are critical to diagnosing and treating Chlamydia and gonorrhea infections. Therefore, evidence provided concerning success and failures of screening programs should be utilized in developing strategies that focus to improve the way in which we screen sexually active individuals for STDs. Moreover, the gaps in the literature regarding screening recommendations such as determining the cost-effectiveness of screening programs and predictors of disparities in screening strategies (i.e. differences by clinic, health care professional, etc.) warrant the need to research this area further.

2.1.2. Studies Conducted that Investigate Issues Related to STD Healthcare Seeking

Understanding STD healthcare seeking behaviors is a critical prerequisite for reducing the number of STIs and cases of PID among young women. Accordingly, a discussion of characteristics of STD healthcare-seeking behaviors of infected individuals and the screening behaviors of health-care providers are provided to reveal what is currently known about these issues.

Individual Characteristics

Socio-Demographic Factors

Studies researching characteristics of patients that impact STD care-seeking behavior are essential to improving STD care for women. In general, younger age is considered to be a risk factor for STDs and thus is considered to be a negative factor that affects STD healthcare-seeking (Amaro & Gornemann, 1991). Younger individuals may delay seeking care because they are less likely to perceive themselves at risk of infection or they fear seeking care due to parental notification or other issues related to the STD healthcare experience – such as, giving a sexual

health history, or having their confidentiality maintained) (Amaro & Gornemann, 1991; Barth, Cook, Downs, Switzer, & Fischhoff, 2002; Feroli & Burstein, 2003). On the other hand, the 1998 and 1992 National Health and Social Life Survey (NHSLS) found that young persons were significantly more likely to report going to family planning clinics for STD care than adults (Brackbill, Sternberg, & Fishbein, 1999; Mosher & Aral, 1991). In another study, older age (11th and 12th graders) was a strong predictor for STD screening among seventh through eleventh graders (Fiscus et al., 2004). The literature also suggests that females are more likely to seek STD testing than males (Fortenberry et al., 2002; Rietmeijer, Bull, Ortiz, Leroux, & Douglas, 1998). As a result, the age and gender of individuals can affect many aspects of STD seeking behaviors such as where individuals seek treatment, perceptions of their susceptibility to sexually transmitted infections (STIs) , and the comfort level in discussing their sexual history.

Socioeconomic influences on healthcare-seeking behavior are also evident regarding STDs. In a survey of over 2200 women (56% rural; 75% White; mean age of 25years) attending a Women, Infants, and Children (WIC) clinic in Missouri, researchers reported that the most frequent barriers to seeing a physician was having sex with a steady partner, not having symptoms, cost, and embarrassment (Crosby, Yarber, & Meyerson, 1999). A study conducted by Feroli and researchers (2003) found that lack of health insurance or the ability to pay for services and lack of transportation were barriers for seeking STD care in adolescents. In addition, one study found that low household income was associated with greater perceived barriers and lower self-efficacy among adolescent, African-American females (Fortenberry, 1997). So, adolescents may defer seeking care for STDs because they may perceive costs or lack or health insurance as barriers, as well, they may not be able to get to clinics to be tested due to lack of transportation or financial constraints.

One option for addressing the cost of diagnosing and treating STDs is the development of sexually transmitted disease clinics. Sexually transmitted disease clinics provide effective STD care services at a low-cost, yet, preferences to attend these clinics are low. Literature suggests that women prefer private practice physicians or their own physicians for STD care rather than STD clinics (Barth et al., 2002; Brackbill et al., 1999). However, some studies do show positive aspects to attending STD clinics (Brackbill et al., 1999; Hogben et al., 2004). In the study conducted by Hogben and researchers (2004), over 2000 face-to-face interviews were completed with community and health facility populations (mostly African-American and female) that assessed gonorrhea and HIV testing experiences in STD clinics. These researchers concluded that factors related to treatment were more strongly associated with attending STD clinics rather than social factors (Hogben et al., 2004). Study participants believed that STD clinics would cure their gonorrhea infection, provide staff that respected them, and receive care that was low-cost. Nonetheless, confidence in clinic care was associated with experience in seeking STD care. Social factors, such as the stigma of having an STD and confidentiality played a minor role in healthcare-seeking behavior (Hogben et al., 2004). Accordingly, it appears that some young women prefer seeking STD healthcare with private practice physicians and some prefer seeking care in STD clinics. So, there must be various factors that play a role in this decision, hence, further research is needed to understand STD care-seeking behaviors among young women.

Other individual characteristics that impact healthcare-seeking behavior are background factors such as educational level, age at first sexual intercourse, and psychosocial variables. These factors have been associated with STD acquisition among young women and may play a critical role in whether a young woman seeks care or not. Not being able to read health literature (Chacko et al., 2004) and insufficient knowledge concerning STDs (Barth et al., 2002; Huppert

& Hillard, 2003; Tilson et al., 2004) can have a negative impact on STD health-care seeking behaviors. Although knowledge has not been found to improve STD healthcare seeking behaviors, it may assist with accurately perceiving risk and acknowledgement of symptoms among some women (Amaro & Gornemann, 1991; Fortenberry, 1997). As a result, educational level and knowledge may not directly impact healthcare-seeking behavior as much as studies suggest, but may be helpful in developing STD testing programs for those who are less likely to obtain STD testing and care.

Psychosocial Factors

Psychosocial variables such as depression and social support can also affect STD healthcare-seeking behaviors. Depression has been found to be a barrier for seeking care among diverse populations (Amaro & Gornemann, 1991) and it is even associated with other predictors of risky sexual behaviors such as early coital debut (Bachanas et al., 2002). Depression and other areas of mental health (i.e. stress) may impact willingness to seek treatment and ability to perceive susceptibility to STDs. Since there is limited literature on the impact of stress and depression on STD testing behaviors, it will be critical to determine what effect this has on STD healthcare-seeking behaviors.

On the other hand, social support may be a positive impact on STD healthcare seeking behaviors. Fortenberry and others (1999) found that of the eighty percent of adolescents (ages 13 to 20, >90% African-American) who reported receiving social support, the most frequent type of support was from friends and sex partners and included information about symptom interpretation and appropriate clinic use. Additional social support received by these adolescents were being accompanied to their clinic visit and receiving emotional support (Fortenberry & Zimet, 1999). Another study attempted to predict future STD-related care based upon

perceptions of social support among African-American adolescents. This study reported that asymptomatic sexually experienced adolescents (n=145) who talked to their closest friend almost every day were more likely to have had STD related care in the past year, however, closeness to parents/guardians and participation in extracurricular activities were not associated with seeking STD services (Lowery, Chung, & Ellen, 2005). Therefore, social support is a factor that may improve STD testing behaviors among adolescents.

Health-Related Factors

Among women, there are also documented health-related reasons for delaying to seek STD care and treatment. If symptomatic, some women wait to see if symptoms become worse, go away or persist (Aral & Wasserheit, 1998; Fortenberry, 1997; Hook et al., 1997; Mehta, Shahan, & Zenilman, 2000). This may be due to uncertainty about symptoms or perceptions of low risk due to having a "steady" or "permanent" partner (Aral & Wasserheit, 1998; Banikarim et al., 2003). Studies have also found that women take more time than men to seek treatment because before they are seeking social support, seeking information, and self-treating (i.e. taking old antibiotics or douching to relieve symptoms) (Aral & Wasserheit, 1998; Fortenberry, 1997). Among 208 male and female African-American adolescents, some average interval times for seeking care (time from presumed infection to seeking care) was 9.6 days for symptomatic women, 5.8 days for asymptomatic women, 6.3 days for symptomatic men, and 7.3 days for asymptomatic men (Aral & Wasserheit, 1998). These intervals demonstrate that symptomatic females wait longer to seek healthcare. So, it is important for providers and sexually active individuals who are symptomatic or asymptomatic to routinely participate in STD testing behaviors because delaying treatment can lead to other complications such as PID in women.

Another health-related factor that may impact STD testing behaviors is past STD history. One would argue that young women who have had an STD will be knowledgeable enough to seek testing if they have symptoms or engage in behaviors that would prevent them from acquiring an STD. Yet, some studies have found that women with past STDs actually wait longer to seek care (Aral & Wasserheit, 1998; Fortenberry, 1997). In addition, studies have also revealed that past STD history is associated with increased STD risk and risky sexual behaviors (i.e. multiple partners and engaging in unprotected sex) (DiClemente et al., 2002; T. Kershaw et al., 2004). Thus, past STD history may be an important factor when investigating STD testing behaviors.

Screening behavior can also be influenced by testing experience or provider attributes. Many adolescents report barriers to STD testing because of anxiety regarding possible procedures and diagnoses (Barth et al., 2002; Chacko et al., 2004; Rietmeijer et al., 1998; Tilson et al., 2004); the presence of parents during the examinations of adolescents which hinders confidential sexual risk assessments (Shih et al., 2004); and confidentiality issues concerning sexual health services or information in medical records or bills (Amaro & Gornemann, 1991; Feroli & Burstein, 2003; Shih et al., 2004). In addition, studies have found that provider characteristics also impact STD healthcare-seeking (Barth et al., 2002; Tilson et al., 2004). Females may prefer female providers for performing their genital exams (Barth et al., 2002; Dienes, Morrissey, & Wilson, 2004). In some cases, the race of the provider may be important, but one study showed that African American teens' opinions of the race of the provider may be obscured due to fact that they never have been seen by an African American physician (Dienes et al., 2004). So, healthcare experiences regarding STD testing and provider attributes are

fundamental aspects of seeking STD care that should be considered when attempting to understand what impacts this behavior.

Another important barrier to STD testing that has been continuously documented among individuals is the stigma associated with STDs. Several studies show that the stigma associated with acquiring an STD and seeking testing for STDs in clinics appear to negatively impact the attitudes and perceptions that individuals have regarding STD testing. In a qualitative study examining the concept of stigma to STIs in the deep south, Lichenstein (2003) reported that stigma was related to promiscuous sexual behavior of women (looked down upon by health workers due to religious beliefs), negative perceptions of STD clinics as places for Blacks (racial stigma - Blacks were poorer, had no health insurance, and mostly the ones who had STDs), and confidentiality (fear that others would see you at the clinic and talk about you) (Lichenstein, 2003). Thus, stigma can be a serious social-psychological barrier to seeking care for individuals, especially Black females.

In a qualitative study conducted by Barth and researchers (2002), stigma was found to be a barrier among college students seeking STD testing. In addition, perceptions regarding possible negative consequences of testing such as others seeing them, receiving a positive test result, and embarrassment are also other issues that may limit STD care-seeking (Barth et al., 2002). Fortenberry and colleagues (2002) also found that among over 1900 males and females (mean age = 24.9 years old) in 7 cities, STD-related stigma (reflection of the participant's expectation of isolation and adverse social judgment associated with STDs) was associated with a decreased likelihood of being tested for gonorrhea during the past year. Other variables associated with gonorrhea testing were female sex, younger age, enrollment from a health facility, health service use in the past year, suspicion of gonorrhea, and low levels of STD-related

stigma (Fortenberry et al., 2002). Accordingly, STD stigma appears to be a significant barrier to STD testing among all individuals.

For the most part, there appear to be many obstacles to seeking STD care for young women. Several recent studies have elicited adolescents' opinions on what type of services they would prefer when seeking STD testing and care. In one study, Blake and others (2003) conducted focus groups with youth from Job Corps and Department of Youth Services sites (ages 15-24 years; 32 males, 23 females; 29% White, 27% Hispanic, 22% African-American, 15% other race, and 7% Asian) regarding barriers to and motivators for Chlamydia screening. Results indicate that common barriers to testing were fear of someone knowing they got tested or tested positive, fear of acquiring an STD, and fear of AIDS. Motivators for screening were improving knowledge about Chlamydia and its effects, availability of urine testing, providing easy treatment, offering confidential services, and using a home Chlamydia test (Blake, Kearney, Oakes, Druker, & Bibace, 2003). In another study by Tilson and researchers (2004), diverse adolescents (ages 14-24) reported that ideal features of STD services were locations close to familiar places, having extended hours, and the availability of urine-based screening. Some barriers mentioned in this study were costs of STD services, lengthy wait times, language barriers at STD testing sites, perceived discrimination, and perceived judgment from providers (Tilson et al., 2004).

Lastly, in a study investigating features of STD services that are important to low-income African-American adolescents, researchers found that African-American females deemed provider attributes (providers who give clear explanations, answer questions, and have good medical knowledge) and confidentiality as most important (Lane et al., 1999). Other important features were convenient clinic hours and timing of appointments. However, these

adolescents did not prefer school-based health centers for STD care but prefer traveling to a health center outside their neighborhood (Lane et al., 1999). Hence, these studies provide evidence that adolescents know what they want and that there are numerous barriers to STD testing that must be addressed in order to improve diagnosis and treatment of STIs.

In conclusion, individual characteristics of young women are essential to understanding STD testing and seeking behaviors among this population. Socio-demographic factors such as age, gender, race, educational level, and income seem to affect seeking behaviors of young women. Many of the decisions that individuals make to obtain care are based on what they know or if they can afford to get tested. Other factors such as past STD history, stigma, testing experiences, and provider attributes are also critical to ensuring that young women seek care in a timely fashion and without fear of engaging in this health preventive behavior. In general, most adolescent women would like quality STD services that are confidential, easy, friendly, and accessible. As a result, examining the individual characteristics of young women's healthcare seeking behavior is essential for reducing the incidence of STIs within this population.

Health-Care Provider Characteristics

Recently, the role of providers in the diagnosis and treatment of STDs has become a subject of interest for clinicians and researchers. Investigating provider and service-related factors that promote or hinder health care seeking is critical in studying these STD testing behaviors (Amaro & Gornemann, 1991). A primary concern regarding physicians is the reported low rates of STD screening by physicians. A recent survey of primary care physicians (87% in private practice; mean age of 46 years; 81% White, 13% Asian, 4% African-American) documented low rates of routine Chlamydia screening among women (between 20 and 30%) which are at levels well below practice guidelines (St. Lawrence et al., 2002). Moreover, case

reporting levels by physicians for Chlamydia were low and thus partner notification practices were insufficient (St. Lawrence et al., 2002). Another study examining STD screening by obstetricians and gynecologists found that these specialists screen women at a higher rate than other physicians, yet, only about half of obstetricians and gynecologists screened non-pregnant women for Chlamydia or gonorrhea (Hogben et al., 2002). Other studies also reveal that STD screening among adolescent females is lower than recommended CDC guidelines (Ellen et al., 2000; Millstein, Igra, & Gans, 1996; Torkko, Gershman, Crane, Hamman, & Baron, 2000). Therefore, low screening rates by physicians warrant a better understanding of provider attributes that impact STD healthcare-seeking.

An additional examination of Chlamydia screening practices used HEDIS data from 1999 to 2001 to evaluate rates among sexually active women in commercial and Medicaid health insurance plans. This CDC study also found low rates of Chlamydia screening among enrollees in both commercial and Medicaid plans (Shih et al., 2004). Although Chlamydia screening rates were higher among Medicaid enrollees, possibly due to health-care provider's beliefs that Medicaid patients are at increased risk for STDs, overall rates were still below recommended CDC guidelines for sexually active women. Consequently, low rates of screening practices among providers, even when considering access to care, is insufficient and should be addressed immediately for the enhancement of women's health services.

During STD screening practices, it is standard to obtain a sexual history of the individual and then test them for STDs based on their risk. Documented characteristics of providers that regularly take a sexual history are female gender, obstetrics/gynecology specialty, and provider comfort level in discussing sex (Torkko et al., 2000). Characteristics of providers associated with regularly testing adolescent females for Chlamydia are female gender, regularly discussing STD

prevention, and regularly discussing limiting the number of patients' sex partners (Torkko et al., 2000). Another study conducted by Cook and colleagues (2001) assessed barriers to screening sexually active women for Chlamydia among physicians in Pennsylvania. This study found that physicians were more likely to screen for Chlamydia during a routine gynecologic examination if they were female, worked in a clinic versus a solo private practice, worked in a metropolitan area, or had a patient population of African-Americans that was greater or equal to 20 percent (Cook et al., 2001). Therefore, further research should investigate why female providers and certain specialties screen young women more frequently than other providers because understanding these factors can aid researchers in improving adherence to STD screening recommendations.

Stigmas or opinions held by providers may also affect their screening practices or impact the way in which young women access services by these providers. In the aforementioned study regarding an investigation of STIs in the deep south, findings revealed that health workers who had religious convictions may have inadvertently discouraged screening for some individuals based on their beliefs regarding how women should behave morally in relationships (Lichenstein, 2003). Another study found that screening by physicians depended on their beliefs that most 18-year-old women in their practice were sexually active, feeling responsible for providing information about the prevention of STDs to their patients, or knowing that screening for Chlamydia prevents PID (Cook et al., 2001). So, the way providers think about sexuality or STD prevention behaviors seems to impact whether providers follow screening recommendations or not. This area of the literature needs to be further explored because this is critical to improving health services to young women.

Studies examining provider behaviors and their effects on health-care seeking have also provided some insight on utilization of STD care services. A survey of providers and adolescents regarding STD screening found that clinicians barriers to providing adequate screening included concern over lack of confidentiality, inadequate facilities for performing a pelvic examination, clinician discomfort with discussion of sexual behavior, and discomfort with performing pelvic examinations (Huppert & Hillard, 2003). Additionally, physician beliefs that their patients are not sexually active, the prevalence of Chlamydia is low, and that screening for Chlamydia does not prevent PID are also barriers to clinicians adherence to STD screening recommendations (Huppert & Hillard, 2003). The cost-effectiveness of screening, a concern created by the number of false-positive tests, was another reason for providers being less likely to offer Chlamydia screening to adolescents (Huppert & Hillard, 2003). Another area of concern is effective communication by providers. Providers may have difficulty discussing sexuality issues with or acquiring sexual histories of patients because of their comfort level or due to time constraints in their schedule (IOM, 1997). The provider communication style is a crucial factor in patient satisfaction, adherence to regimens, and aspects of other health behaviors (Amaro & Gornemann, 1991). As a result, clinician barriers to screening such as inadequate facilities to perform testing and difficulty in discussing sexual issues leads to non-adherence to screening recommendations and ultimately missing young women who potentially have an STD and need to be treated.

Another area to consider regarding adherence to STD screening recommendations would be system factors within clinic or doctor's office settings that hinder effective STD screening practices. In a study evaluating a urine-based Chlamydia screening program, difficulty in implementation was found to be a barrier to adherence to screening recommendations (Chacko et

al., 2004). Issues related to absence of protocols for collecting urine specimens confidentially, primary care physicians not taking sexual histories, lack of awareness of Chlamydia infection in their practice, low levels of knowledge regarding urine tests, and reluctance of staff to be involved in STD screening were barriers to implementing an effective screening program in this study (Chacko et al., 2004). So, there appear to be many barriers for providers concerning the screening of women which is an area that needs to be studied in order to understand how system factors can be modified to foster improved screening practices.

In an evaluative examination of STD clinics in three cities, researchers found that initial notification procedures for women with positive Chlamydia or gonorrhea tests delayed treatment (Wong, Berman, Furness, Gunn, & Peterman, 2005). Results showed that the median time to treatment was 18 days in Washington, D.C., 8 days in Los Angeles, and 14 days in San Diego. To address poor notification practices, an intervention in San Diego was implemented which improved notification to patients (within 24 hours of laboratory receipt). In addition, notification procedures were enhanced by maintaining a logbook that tracked progress and treatment compliance. Overall, notification days in San Diego were reduced from 14 days to 7 days (Wong et al., 2005). Thus, health system factors such as procedures for collecting specimens and notifying women of infections may cause providers to be modest regarding screening recommendations and cause delays for individuals who need to return for treatment.

In summary, provider characteristics are essential aspects of STD screening and testing practices that an individual cannot control. Low rates of screening by providers demonstrate that there must be several barriers to screening or insufficient knowledge regarding the dire need for STD screening among sexually active individuals. Barriers such as not being comfortable taking a sexual history to not believing that the population served is at risk for disease are issues that

need to be more aggressively addressed in medical training. Other problems regarding health system factors that impede the screening process should also be modified to improve screening practices within medical facilities. In general, the stigma attached to sexuality, female providers being more inclined to perform STD screening during a gynecological exam, and other barriers mentioned above are all factors which impact STD screening behaviors. Although the proposed study will not examine provider characteristics and their affects on STD seeking behaviors, the information presented is evidence that provider and health system characteristics are major contributors to the STD healthcare utilization of young women.

2.1.3. STD Screening and Care Outside of Clinic Settings

The concept of screening outside of clinic settings is a new phenomenon that has occurred as a result of the need to improve client participation in STD screening programs. This idea aims to provide confidential screening that can be completed without invasive techniques. In a small, telephone-based study (n = 120) that assessed young adults' (ages 18 to 25; 41% White, 33% Latino, and 22% Black) attitudes, beliefs, and feelings about testing outside of clinic settings found some encouraging information. These individuals reported that they would use the self-test urine screening kits if available and that advantages of testing outside of clinic settings were privacy, increased testing, convenience, and possibly lower costs (Ford, Jaccard, Millstein, Viadro et al., 2004). Some of the disadvantages of testing outside of clinics were doubts about test accuracy, doubts that young people with positive tests will get treated, and doubts that the test would be used among people at risk of infection (Ford, Jaccard, Millstein, Viadro et al., 2004). In addition, most respondents said they would call for results and seek treatment if they have a positive test, however, a clear disadvantage would be not being able to have a face-to-face discussion with provider about a positive test and possible negative emotions

from a positive test (Ford, Jaccard, Millstein, Viadro et al., 2004). So, testing outside of clinic settings appears to have both advantages and disadvantages regarding testing behaviors, however, this initiative could provide an innovative method that encourages testing within young women.

One setting that is of primary interest as an alternative STD screening strategy regarding adolescent and young populations is schools. Evidence suggests that STD testing in schools is both feasible and acceptable to parents (D. Cohen, Nsuami, Martin, & Farley, 1999) and students (D. Cohen et al., 1999; Coyne-Beasley, Ford, Waller, Adimora, & Resnick, 2003; Kent, Branzuela, Fischer, Bascom, & Klausner, 2002). Studies also show that expansion of STD screening programs in school settings was helpful in diagnosing and treating asymptomatic Chlamydia and gonorrhea infections among girls and boys (D. Cohen et al., 1999; Kent et al., 2002). In the Cohen study (1999), researchers were also able to reduce re-infections and the prevalence of Chlamydia among boys in these schools(D. Cohen et al., 1999). An economic evaluation of a school-based STD screening program in New Orleans which used a decision tree analysis found that this type of program reduced Chlamydia prevalence, reduced the occurrence of PID and other sequelae, and resulted in a net cost-savings to the health-care system (Wang, Burstein, & Cohen, 2002). Although there is some concern regarding confidentiality for school-based screening (i.e. a minor being able to legally consent to STD testing), the literature presented demonstrates the utility of school-based STD screening programs as another strategy to improve diagnosis and treatment of STIs among young populations as well as reduce incidence and re-infection of STIs.

Another possible venue for STD testing outside of clinics is testing in community settings. In an attempt to reach populations in their neighborhoods, Kahn and researchers (2003)

conducted an innovative community-based screening strategy in Baton Rouge, Louisiana (a collaboration of the health department and two community-based organizations). Within the Kahn study, a mobile van was used to offer free promotional health screenings to the general public in an assortment of settings such as parking lots of bars, churches, restaurants, stores, and vacant lots. Results from this study revealed that among over 2200 urine samples, 8.3 percent were positive for Chlamydia (9.9% in females, 5.5% in males, >85% asymptomatic) and 4.9 percent were positive for gonorrhea (5.3% in females, 4.1% in males, >65% asymptomatic) (Kahn, Moseley, Thilges, Johnson, & Farley, 2003). In addition to identifying asymptomatic chlamydial and gonorrheal infections and co-infections, over 90 percent of those with a bacterial infection were treated. A street survey of 389 individuals from the community administered during this study indicated that 97 percent thought that neighborhood STD testing strategy was a "good" or "very good" idea (Kahn et al., 2003). A similar Chlamydia and gonorrhea screening study in San Francisco (a collaboration between a local faith-based organization and the San Francisco Department of Health) utilized youth trained to provide STD prevention education to at-risk youth (Moss, Gallaread, Siller, & Klausner, 2004). This initiative encouraged individuals under 25 years of age to attend community testing venues (i.e. barber shops, etc.) to be screened for STDs. The results of this 6-month initiative were promising because out of 450 youth screened, 9 percent tested positive for Chlamydia, gonorrhea, or both (Moss et al., 2004). In addition, all those infected received treatment in the field and some even accepted treatment for their partners (Moss et al., 2004). Thus, STD screening programs that utilize community settings emerge as a successful strategy for identifying asymptomatic STIs, providing convenient access to STD services, and treating infections.

Testing outside of clinic settings also implies that testing procedures used will be convenient, easy to perform, and be specific for detecting chlamydial and gonorrheal infections. With the development of NAATs, sensitive and specific, noninvasive testing is available as a useful option in alternative STD testing programs. One testing procedure that has been researched for acceptability and feasibility outside of the normal clinic setting is urine-based screening. In a population of high-risk adolescents from a detention center (>60% African American), a substantial number of asymptomatic Chlamydia and gonorrhea infections were diagnosed and treated with first-void urine screening (Oh et al., 1998). Emergency departments are another setting where urine-based screening can be used in an efficient manner and be acceptable to most patients (Monroe, Wiess, Jones, & Hook, 2003). In addition, urine-based screening for STDs has also been used in substance abuse settings which can be an opportune time to diagnosis and treat at-risk populations (Lally et al., 2002). As a result, evidence demonstrates that urine-based screening in various settings can be an option for acceptable and feasible STD testing, especially in places where STD testing is not the norm.

Another setting that provides an opportunity for STD care is the emergency department (ED). Although emergency rooms are located within a hospital or clinic setting, they are still considered to be a location that is different from the normal clinic environment. Many emergency departments are sites for primary care services, including STDs in populations that are underserved or located in the inner-city. Research suggests that persons who access emergency departments in need of STD care are mostly unknowledgeable of available STD clinic services in their community, unable to go because of restricted hours of STD clinics, embarrassed to go to STD clinics, or misclassified their symptoms as not STD-related (Mehta et al., 2000). In a study of an inner-city Baltimore, Maryland ED population indicated that those

who mostly attended this ED were single females, had health insurance, and had a history of an STD in the past year. Men were more likely to have no usual source of care and a past STD (Mehta et al., 2000). Hence, EDs represent a setting that may be overburdened by STD care and should be used as a potential source to enhancing access to comprehensive STD healthcare that is convenient and provides quality service. In addition, population characteristics of emergency rooms may be important predictors for targeting screening methods based upon the health risks of the community.

The most recent and popular alternative to clinic screening presented in STD prevention literature that is outside of the clinic setting is home sampling. Home STD testing or home sampling can be used to improve testing behaviors and individual attitudes toward STD testing. Several studies indicated that home sampling may be a valuable option in STD control efforts (Bloomfield, Kent, Campbell, Hanbrook, & Klausner, 2002; Tebb, Paukku, Pai-Dhungat, Gyamfi, & Shafer, 2004). Many of these studies included only men and used urine-based screening techniques to facilitate this process. However, the latest studies focus on recruiting women into home sampling interventions that use self-collected swab samples as the mechanism for testing specimens. These studies also reveal that using self-collected swab samples in community settings are acceptable and feasible (Richardson et al., 2003; Smith et al., 2001). In a study of 512 African American adolescent females in a non-clinical STD/HIV prevention program, researchers found that all participants chose vaginal swabs (versus a pelvic examination) as their preference for an STD testing method (Smith et al., 2001). The results of testing in this population discovered that approximately 20 percent of females were infected with Chlamydia or gonorrhea and that patient-obtained vaginal swabs were adequate and appropriate specimens for STD screening sites that are non-clinical (Smith et al., 2001). In general, vaginal

swab sampling (or self-sampling) may be helpful in facilitating STD screening among women who are at high-risk for infections or who may not readily access health services (i.e. may be fearful of pelvic exams, stigma, or other barriers). In addition, vaginal swab sampling is also useful in determining the prevalence of infections in hard to reach populations (Richardson et al., 2003). Therefore, a promising testing alternative to STD testing in community settings may be home testing. However, the overall success of this alternative is still being evaluated.

Additional studies have also investigated STD testing programs outside of clinic settings. When given a choice of home urine-based screening or vaginal swabs for STD testing, a group of sexually active females (ages 13 to 20 years, 53% African-American, 30% White, 26% Asian, 20% Latino) favored home urine-based screening (Tebb et al., 2004). In addition, adolescent females who believed they were at-risk for infection preferred testing at home than attending a clinic (Tebb et al., 2004). In a comparable study that assessed the preference of self-collected vaginal swabs or first-void urine test in detecting chlamydial infections among approximately 1300 female army recruits (mean age was 20.3 years, 48.3% White, 35.7% Black, 13.1% other races), urine was preferred over swab testing in a clinical setting (Hsieh, Howell, Gaydos, McKee, & Quinn, 2003). In this study, there were no racial preferences for urine testing, however, self-collected swab testing was associated with being White and having had sexual risk behaviors in the past 3 months (Hsieh et al., 2003). Thus, home sampling, especially if urine tests are available, appear to be the most acceptable test among sexually active females and can be helpful in diagnosing asymptomatic STIs.

In conclusion, testing outside of clinic settings appears to be the newest and most acceptable method for encouraging STD testing among young women. Much of the literature mentioned, urine-based screening as the most convenient and easiest procedure for young

women to participate in STD screening. Some STD screening programs prefer home vaginal swab sampling for women because there may be some difficulty in storing urine or other issues related to getting the urine to a lab for testing. In addition to these easier sampling procedures, STD testing in the community can assist with access issues and possibly persuade those who are less likely to seek screening to participate in places they deem as non-threatening (i.e. places in the community, etc.). So, most studies that discuss STD testing outside of the clinic setting demonstrate that women see many advantages to testing at home. On the other hand, there may be some disadvantages to testing outside of the clinic settings. One article mentioned that testing initiatives outside of clinic settings could lack private personal interactions with healthcare professionals who can discuss and recommend testing (Ford, Viadro, & Miller, 2004). There may also be disadvantages related to return treatment if no treatment is offered in the community and difficulties in relaying STD-preventive information to promote healthier sexual behaviors. Thus, STD testing outside of clinic settings may prove to be a great option for providers to improve access to care for hard-to-reach populations, track prevalence of infections and treatment of patients, and motivate individuals to participate in STD screening programs. However, there are still some challenges to implementing a program that exhibits overall effectiveness.

2.1.4. Background Information Related to Racial Disparities in STD Rates

Within the population of study participants for this research, approximately 60 percent are young African-American women under the age of 21. Young, African-American females suffer disproportionately from STDs in the US and the most optimal method to address these disparities would be to determine what factors impact their behaviors. Research has suggested a myriad of explanations for the increased STD risk among young African-American females.

Demographic characteristics such as age, gender, race, and socioeconomic status (SES) have been principle areas of research regarding the STD/HIV epidemic. These areas have also been researched regarding racial disparities in STD rates. Young age indicates various developmental changes that occur physically and cognitively among young women. During puberty, the columnar epithelium lining of the cervix is exposed and cells on this lining are particularly susceptible to an attack by chlamydial and gonococcal organisms (Shrier, 2004). In addition, national research studies indicate that African-American girls sexually mature earlier (undergo puberty) and have earlier ages at menarche (Chumlea et al., 2003; Sun et al., 2002). There may also be social cognitions at puberty which may foster feelings of sexual arousal (O'Sullivan, Meyer-Bahlburg, Nat, & Watkins, 2000) and being physically mature may provide opportunities for boys to persuade them to engage in sexual intercourse (W. Doswell & B. Braxter, 2002; L. O'Sullivan, H. Meyer-Bahlburg, R. Nat, & B. Watkins, 2000). Thus, earlier physical maturity among young African-American females might foster premature sexual activity which may increase their chances of acquiring an STD.

Early sexual intercourse (also known as early coital debut) has also been associated with increased risk for STDs among young African-American females. Having sex at an early age can affect life long number of partners and increase one's opportunity for having a history of an STD (Greenberg, Magder, & Aral, 1992; Seidman, Mosher, & Aral, 1994). Some of the most common influences on the timing of sexual intercourse for young African-American adolescents other than pubertal development are peer norms about having sex (W. M. Doswell & B. Braxter, 2002; Marin, Coyle, Gomez, Carvajal, & Kirby, 2000; L. F. O'Sullivan, H. Meyer-Bahlburg, R. Nat, & B. X. Watkins, 2000; Rosenthal et al., 2001; Santelli et al., 2004), self-esteem (Goodson, Evans, & Edmundson, 1997; Spencer, Zimet, Aalsma, & Orr, 2002), personal values (Paradise, Cote,

Minsky, Lourenco, & Howland, 2001), family characteristics (Goodson et al., 1997; McBride, Paikoff, & Holmbeck, 2003), and religious affiliation (Goodson et al., 1997; Paradise et al., 2001). So, although there are numerous issues that affect early coital debut in young African-American females, no evidence has been provided by these studies to explain the increased STD rates in this population.

Several population-based and community-level studies have examined the influence of race and SES on increased STD risk among young African-American females. Race has traditionally been associated with the incidence of STDs and has also been used as a risk marker for both sexual and healthcare-seeking behavior (Aral, Fullilove, Coutinho, & Van Den Hoek, 1991). Risk markers are different from risk factors because they describe independent variables such as number of sexual partners and alcohol use which have an indirect relationship causing the outcome of interest (Padian, Shiboski, & Hitchcock, 1991). Therefore, race can be considered a risk marker and not a risk factor for increased risk of STDs in young African-American women because African-American race alone is not associated with acquisition of STDs.

Additionally, there are also several aspects of SES which have been linked with STD risk in African-American women. Characteristics of young African-American women such as low parental income (Newbern, Miller, Schoenbach, & Kaufman, 2004), unemployed parental status (Sionean, DiClemente, Wingood, Crosby, & Cobb, 2001), low maternal education (Newbern et al., 2004), and broken family structure (Sionean et al., 2001) have been linked with STD risk within this population. Research has also used innovative indicators of SES and found that the lack of social capital, living in poverty, and income equality correlated with Chlamydia acquisition (Holtgrave & Crosby, 2003). Also, low rates of social cohesion such as the closeness

of the neighborhood (Ellen, Jennings, Meyers, Chung, & Taylor, 2004) and high "broken windows" index which is a non-traditional measurement of SES that examines housing quality, abandoned cars, graffiti, trash, "off-sale" alcohol outlets, and public school deterioration (D. Cohen et al., 2000) were associated with a high prevalence of gonorrhea in these studies. As a result, these measures of SES demonstrate the complexity of SES and how it may impact the increased risk for STDs among young African-American women.

Research investigating STD knowledge and attitudes of young African-American females has also revealed some surprising information regarding STD disparities. An assessment of sexuality education guidelines provided by the Sexuality Information and Education Council of the United States (SIECUS) found low STD knowledge and inaccurate risk perceptions of STDs among a population comprised mostly of young African-American females (Clark, Jackson, & Allen-Taylor, 2002). Even having a past history of an STD which is believed to increase one's knowledge of STDs, did not have an effect on adopting STD/HIV prevention behaviors (Clark et al., 2002; DiClemente et al., 2002). Therefore, young African-American females' STD knowledge may either be low or not sufficient enough to motivate changes in their behaviors.

Attitudes toward and perceptions of STDs are areas where researchers have attempted to explain STD disparities among young African-American women. In one study, over 500 young African-American females were found to have low percentages of STD worry (part of the construct of perceived threat which creates worry and may be an indication of dissonance – possibly a strong motivating factor for change), report infrequent communication with partner, and have low perceived ability to negotiate condom use (Crosby, DiClemente, Wingood, Sionean, Harrington, & Davies, 2001). Another study of over 400 urban female adolescents (44% African-American) found that about half the participants misperceived their risk for

precarious sexual behaviors (T. S. Kershaw, Ethier, Niccolai, Lewis, & Ickovics, 2003). Approximately 42 percent of the participants were at high risk for unsafe sexual behaviors (e.g. unprotected sex with multiple partners), but 65 percent believe that their behaviors were slightly or not at all risky (T. S. Kershaw et al., 2003). Ironically, those who perceived themselves at higher risk were more likely to not use condoms, have had multiple sex partners, have had sex with a risky sexual partner, have an STD diagnosis, have higher aggregate sexual risk in the past year and have low STD risk knowledge (T. S. Kershaw et al., 2003). Thus, young African-American females appear to not be worried about STDs and have inaccurate perceptions regarding risks of STDs which is not any different from most adolescents.

Numerous studies have examined whether sexual behaviors explain the disparities in STD rates among young African-American females (Boyer et al., 2000; K. Miller, Forehand, & Kotchick, 2000; Ramirez-Valles, Zimmerman, & Newcomb, 1998). Yet, there are no studies which offer any concrete evidence demonstrating a relationship between riskier sexual behaviors of African-American females with STD acquisition. There is even one study that shows African-American females engaging in less riskier sexual behaviors (Quadagno, Sly, Harrison, Eberstein, & Soler, 1998). So, the lack of association between riskier sexual behaviors among African-Americans has led to studies examining partner choices by African-American women and corresponding sexual networks.

Research investigating partner choices and sexual networks among African-American women suggests that there are limited, eligible African-American men which may change norms related to engaging in traditionally monogamous relationships (Harawa, Greenland, Cochran, Cunningham, & Visscher, 2003; Wingood & DiClemente, 1998). In addition, African-American women appear to engage in powerless (Rickert, Sanhvi, & Wiemann, 2002), concurrent

(Adimora et al., 2002; Kelley, Boawski, Flocke, & Keen, 2003), and socioeconomically imbalanced relationships which may place them at increased risk for STDs. These sexual relationships also appear to be immersed within geographical areas that have high percentages of African-Americans living in them and high rates of Chlamydia and gonorrhea (a sexual network explanation). As a result, engaging in unfavorable relationships and possibly choosing partners within high-risk areas are causes for concern regarding the increased risk for STDs among young African-American females.

Overall, young African-American women have increased risk for STDs. Yet, there is not one explanation for why STD rates are higher among this population. Young African-American women do not engage in riskier behaviors such as drug or alcohol use nor participate in riskier sexual behaviors. Nevertheless, a combination of many factors such as early age at first intercourse, low SES, low social and family support structures, cultural attitudes, sexual networks, and the imbalance in the ratio of African-American men to women may all play a role in this epidemic. Thus, when exploring methods to improve STD healthcare-seeking behaviors of populations, taking these disparity issues into account may prove to be essential to reducing the incidence of PID among all young women.

3. CHAPTER III.

3.1. THEORETICAL FRAMEWORK

3.1.1. The Health Belief Model

This chapter will include a discussion of (a) the historical origins of the Health Belief Model (HBM); (b) an explanation of HBM components and their use in predicting STD-preventive and screening behaviors; (c) the applicability of the HBM among African-American populations; and, (d) the adapted model that will be used to explain the two main outcomes of this study.

Historical Origins

The Health Belief Model (HBM) was initially developed by social psychologists during the 1950s to understand a lack of participation in disease detection and prevention programs established by the U.S. Public Health Service. Later the HBM was expanded to understand people's responses to symptoms and their adherence to medical regimens (Janz, Champion, & Strecher, 2002). The HBM is one of a class of theories known as a value-expectancy theories. As such, value-expectancy theories of health-related behavior, explain behavior in terms of the desire to avoid illness or to get well (value) and the belief that a specific health action available to a person prevents illness (expectation) (Janz et al., 2002). The expectation component is represented by the individual's estimate of personal susceptibility to and severity of an illness, and of the likelihood of being able to reduce that threat through personal action (Janz et al., 2002). The HBM has been one of the most widely used psychosocial approaches to explaining health-related behavior (Rosenstock, Strecher, & Becker, 1994).

HBM Components and Their Use in Predicting STD-Preventive and Screening Behaviors

The first documented use of the HBM was in 1958 by Hochbaum who studied probability samples of more than 1200 adults in 3 cities that conducted tuberculosis (TB) screening programs in mobile X-ray units (Rosenstock et al., 1994). One's "readiness" to obtain an X-ray was assessed by their beliefs that they were susceptible to tuberculosis and their beliefs in the personal benefits of early detection (Rosenstock et al., 1994). Since Hochbaum's survey, researchers have expanded and clarified the model to include preventive actions such as illness behaviors and sick-role behaviors (Rosenstock et al., 1994). Generally, people are believed to take action to prevent, screen for, or control ill-health conditions if they regard themselves as susceptible to the conditions, if they believe it would have potentially serious consequences, if they believe that course of action available to them would be beneficial in reducing their susceptibility to or the severity of the condition, and if they believe that the anticipated barriers to (or costs of) taking the action are outweighed by its benefits (Janz et al., 2002).

The components of the HBM (Figure 3.1) are described below.

INDIVIDUAL PERCEPTIONS

Perceived Susceptibility

Perceived susceptibility or perceived risk refers to one's subjective perception of the risk of contracting a health condition (Janz et al., 2002). The acceptance of personal susceptibility or risk of a condition varies widely by individuals. Individuals may deny the possibility of contracting a condition, admit the possibility of disease, or express feelings of real danger for contracting the condition (Rosenstock, 1974). Perceived susceptibility is also believed to be a motivating factor for attitude or behavior change in the HBM (Sydney, Patterson, Hadley, Barnard, & Alpert, 2000).

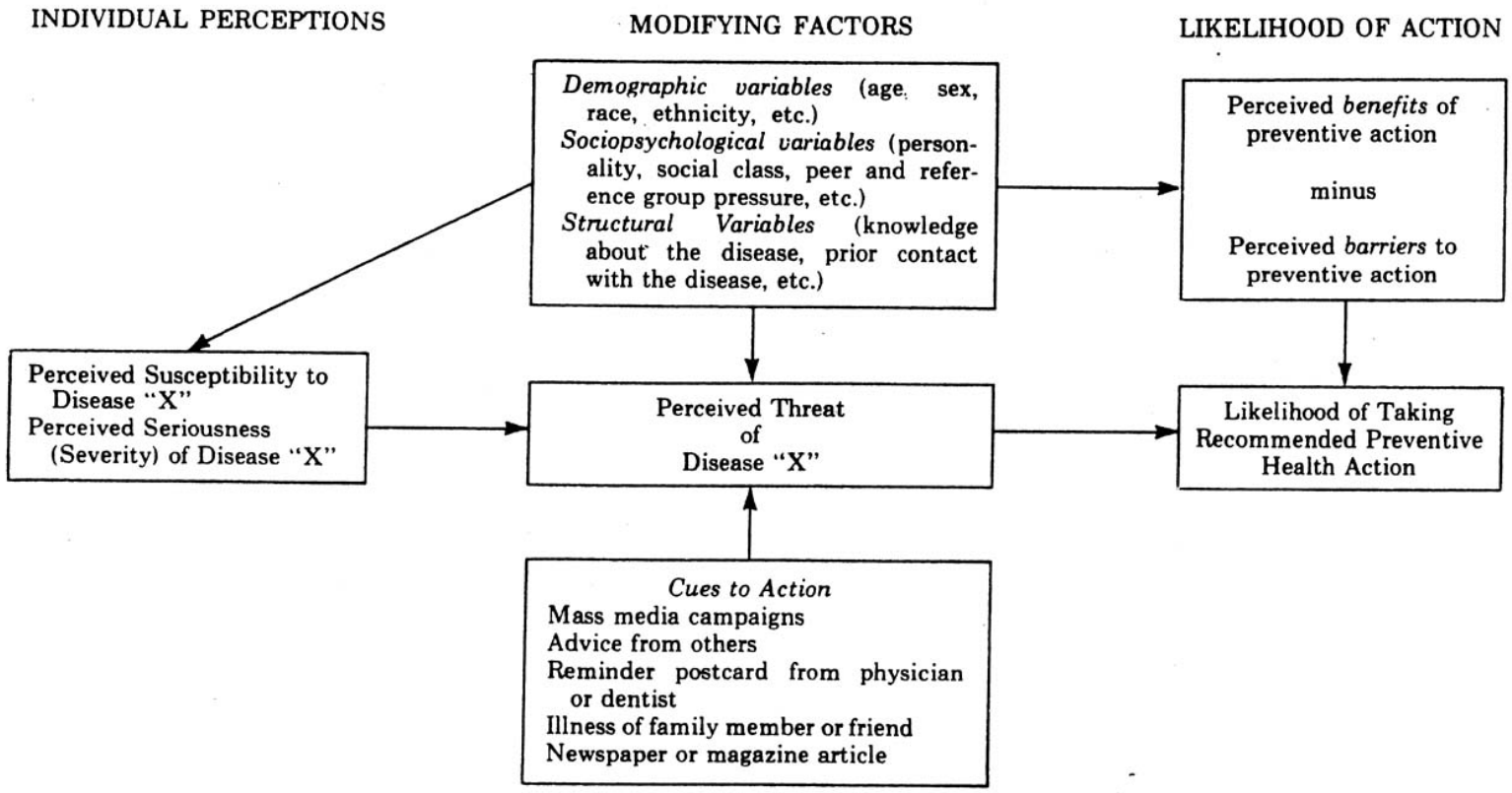

Figure 3-1 The Health Belief Model as Predictor of Preventive Health Behavior

(Becker, Drachman, & Kirscht, 1974)

The current study examines the relationship between perceived susceptibility and STD testing behaviors.

Perceived Severity

Perceived severity refers to one's convictions concerning the seriousness of a health condition. The degree of seriousness also varies by individuals. Individuals may perceive the severity of a health condition based on its medical or clinical consequences (e.g. death, reduced physical or mental functioning, or pain) or social consequences (e.g. effects of disease on one's job, family life, and social relations) (Rosenstock, 1974). The current study investigates whether perceived severity is associated with STD testing behaviors.

Perceived threat has been noted as a critical initial cognitive step in the course of taking on a recommended action to reduce the threat of a disease or illness. The HBM views perception of threat as a combination of two factors: an individuals' perception that he/she is susceptible to the disease or illness and a perception that the illness is severe, where severity can consist of medical, clinical, financial, and social consequences (Rosenstock et al., 1994).

MODIFYING FACTORS

Modifying factors are diverse variables that indirectly influence health-related behaviors and may affect an individual's perceptions. These factors consist of demographic (e.g. age, gender, race, education, income, etc.), socio-psychological factors (e.g. personality, social class, peer and reference group pressure, etc.), and structural factors (knowledge about the disease, prior contact with the disease, etc.). Socio-demographic factors, especially educational attainment, are believed to indirectly influence the perception of susceptibility, severity, benefits, and barriers (Rosenstock, 1974; Rosenstock et al., 1994). The current study examines whether

selected modifying factors influence perceptions and ultimately determine if they are associated with STD testing behaviors.

LIKELIHOOD OF ACTION

Perceived Benefits

Perceived benefits refer to the particular course of action that is taken based upon beliefs regarding the effectiveness of that action in reducing the perceived threat. Individuals who demonstrate an optimal level of beliefs in susceptibility and severity would not be expected to accept any recommended health action unless the action was perceived as potentially beneficial (Rosenstock et al., 1994). The current study assesses whether perceived benefits (expected positive effects) affect the behavior of interest, STD testing.

Perceived Barriers

Perceived barriers are the potentially negative aspects of a particular health action which may act as obstacles to following a recommended behavior. Individuals may engage in a cost-benefit analysis that weighs the effectiveness of a health action against negative perceptions (e.g. being too expensive, dangerous, having side effects, unpleasant, inconvenient, time-consuming, etc.). Hence, the perceived threat of disease and the perceptions of benefits (less barriers) provide a preferred course of action (Rosenstock et al., 1994). The current study investigates whether perceived barriers to STD testing influenced the study populations' STD testing behaviors.

Cues to Action

Early in the development of the HBM, some formulations of the model included the concept of cues that may encourage action. Although cues may prove to be important when assessing health promotion behaviors, its role as an adequate measure for action has not been

logically studied (Janz et al., 2002; Rosenstock, 1974). The current study will not assess whether cues to action (e.g. telephone reminders, postcards, etc.) are associated with STD testing behaviors. All study participants were encouraged to participate in routine testing and to return the home sampling kit.

The existing literature provides empirical support for the HBM in explaining health prevention behaviors and behaviors in response to symptoms or diagnosed disease (Rosenstock et al., 1994). Janz and Becker (1984) assessed the HBM in 46 prospective and retrospective studies of health-related behavior conducted between 1974 and 1984. Some of the preventive behaviors included in the review were influenza inoculations, a Tay-Sachs carrier status screening program, practice of breast self-examination, and attendance at a high school screening program. Sick-role behavior studies included compliance with anti-hypertensive medications, diabetic regimens, and end-stage renal disease regimens. Summary findings in this review offer encouraging support for the HBM in prospective and retrospective studies. Perceived barriers were found to be the strongest predictor of all behaviors while perceived severity was the least powerful predictor (Janz & Becker, 1984). In addition, perceived susceptibility was found to be a stronger predictor of preventive health behavior whereas perceived benefits predicted sick-role behavior much better (Janz & Becker, 1984; Rosenstock et al., 1994). This review suggests that the HBM components have assisted researchers with explaining preventive and sick-role behaviors in an attempt to design programs to promote desired behaviors.

As a result of studies such as the Janz and Becker (1984) study, the HBM has been used more widely to assess the relationship of model components with STD preventive behaviors or disease occurrence. In a recent study, Ford and researchers (2004) assessed young adults' perceptions of risk with numerous variables and current chlamydial or gonorrheal infection using

Wave 3 of the 2001-2002 National Longitudinal Study of Adolescent Health survey. This survey provides a diverse (68% White, 16% Black, 11% Hispanic, 3% Asian, 1% Native American; 50% female), nationally representative sample of over 11,000 sexually experienced 18 to 26-year-olds who perceived their risk of infection as low (14% of all surveyed). Of participants who tested positive for Chlamydia or gonorrhea (approximately 500 participants, 58 % female; 34% White, 50% Black, 15% Hispanic, and 2% Asian) only 33 percent reported a perceived risk of infection (Ford, Jaccard, Millstein, Viadro et al., 2004). The multivariate analyses revealed that perceived risk of infection was associated with being Black or Hispanic, using condoms inconsistently or not using them at all, having exchanged money for sex, having been tested in the past year but had not received a diagnosis, having received a diagnosis, and reporting current symptoms (Ford, Jaccard, Millstein, Bardsley, & Miller, 2004). The use of the HBM construct of perceived risk or susceptibility of infection in this investigation appeared to help explain characteristics of the individual who may be at increased risk of infection.

Perceived susceptibility has also been studied among several populations to determine its relationship with a range of variables. Kershaw and researchers (2004) assessed changes to perceived susceptibility, sexual risk behaviors, and attitudes toward condoms among 308 adolescents (ages 14 to 19, 48% African-American) who had been recently diagnosed with an STD. Results indicate that there were no significant changes in perceptions, sexual risk behaviors, or attitudes following the diagnosis of an incident STD compared to those with no diagnosed incident of STD (T. Kershaw et al., 2004). Another study conducted by Sydney and colleagues (2000) examined racial differences in adolescent's risk perceptions of major diseases (e.g. HIV) and motor vehicle injury. The findings in this study demonstrate that risk perceptions do differ by race, gender, and income. Girls rated their risk of disease or injury as similar to

boys (but are actually at less risk) and Caucasian adolescents rated their risk of disease or injury higher than African-Americans for most examples (e.g. car accident, cancer, heart attack, and stroke), when the reverse is actually true (Sydney et al., 2000). Risk for HIV was assessed similarly by race and higher for boys. Mortality data report that these assessments are incorrect and that knowledge regarding HIV may impact perceived risk and/or may impact HIV-preventive behaviors in which individuals engage (Sydney et al., 2000). Thus, evidence demonstrates that individuals misperceive their risk for STDs and HIV that may affect their prevention behaviors and be indicators of other background factors (race, gender, knowledge, etc.).

HBM factors have also been used to predict sexual preventive behaviors in diverse populations. Zak-Place and Stern (2004) tested the utility of the HBM and identified factors of the HBM that best predict safe-sex practices among 202 college students in the US (ages 18 to 22, 82.3% White, 5.7% Black). Primary results indicated that male students were significantly more likely to intend to use condoms in the future while female students were more likely than males to report intentions to obtain STD and HIV testing (Zak-Place & Stern, 2004). Additional analyses revealed that neither perceived vulnerability (susceptibility) nor severity of STDs and HIV were significant predictors of condom use or intended STD testing (Zak-Place & Stern, 2004). A unique finding was that HIV severity was significantly and negatively related to intended HIV testing. Moreover, a coping appraisal variable that was created concerning response efficacy (e.g. the higher the perceived benefits, such as early detection and medical care, the greater the likelihood that college students intended to get tested) was supported as a predictor of both intended STD and HIV testing behavior (Zak-Place & Stern, 2004). So, this article was unable to confirm the utility of the HBM to predict sexual preventive behaviors

among college students, nevertheless, the HBM can be helpful in creating models that are more comprehensive and appropriate for similar populations.

A similar study conducted by Dorr, Krueckeberg, Strathman, and Wood (1999) explored the influence of HBM variables on 111 heterosexual college students' decision to obtain HIV testing (62% women, 93% White). Findings show that individuals seeking HIV testing perceived more benefits of having a test, perceived fewer barriers to getting a test, considered future consequences, and engaged in riskier sexual behaviors (Dorr, Krueckeberg, Strathman, & Wood, 1999). Once again, HBM components can be helpful in explaining some testing behaviors, but must be expanded for a more in-depth understanding of what impacts these behaviors.

The concept of perceived threat (combination of perceived susceptibility and severity) has also been explored. Crosby and researchers (2001) investigated perceived threat among 522 high-risk (sexually active in the past 6 months), adolescent African-American females (ages 14 to 18). The concept of perceived threat was measured by an adolescents' worry that they or their partner were or would become infected with an STD (Crosby, DiClemente, Wingood, Sionean, Harrington, Davies et al., 2001). Overall, the findings demonstrate that this population of adolescent African-American females has low STD worry. Results revealed that higher levels of STD worry (perceived threat of STDs) were associated with a history of an STD, low partner communication, and low perceived ability to negotiate condom use with a male partner (Crosby, DiClemente, Wingood, Sionean, Harrington, Davies et al., 2001). So, this study shows that components of the Health Belief Model can be combined to measure concepts such as perceived threat that are associated with risky behaviors.

Cervical cancer screening behaviors and beliefs have also been investigated using the Health Belief Model. Burak and Meyer (1997) discovered that over 400 women (ages 18 to 23, no racial data given) attending a New England college had low perceptions of susceptibility to STDs and cervical cancer, but had high perceived severity of STDs and cervical cancer. Potential perceived barriers to gynecological screening were pain (36%), embarrassment (62%), or belief that gynecological exams are expensive (42%) (Burack & Meyer, 1997). Overall, HBM constructs only explained 15% of the variance in screening behavior, but when two cues to action were added to the equation with an intention to have a gynecological exam (i.e. prior abnormal Pap and having had an STD), they added little or none to the overall variance (Burack & Meyer, 1997). As a result, HBM constructs provided beneficial information regarding gynecological screening, however, the model was not useful in predicting women's intentions or screening behaviors (Burack & Meyer, 1997). Examining cervical cancer screening in regards to STD screening behaviors is similar to STD testing because it includes an invasive technique in which women have to endure.

In summary, many of the studies reviewed used only specific components of the HBM to assess the relationship of HBM factors with disease-preventive behaviors or STD acquisition. To my knowledge and from reviewing the literature, there is limited literature that uses HBM constructs in predicting STD testing behaviors. The Zak-Place article reported that the utility of the HBM was unsupported among a population of college students and that STD testing behaviors may reach beyond the standard social-cognitive model. In contrast, some studies demonstrate that HBM components can be helpful in explaining STD or cervical cancer screening behaviors. In general, it appears that the HBM can be used for investigating

preventive and sick-role behaviors; yet, further research is warranted to determine methods to increase the utility of the model among diverse populations.

The Applicability of the HBM Among African-American Populations

Much of the literature supporting the utility of the HBM has been conducted among homogenous populations which do not include African-American or other racial/ethnic populations. Use of the HBM among diverse populations, especially among African-American or Hispanic populations, should be of primary concern to public health researchers. Since the racial/ethnic composition of the US is increasingly changing, it is important that research studies assess and use the HBM to determine its applicability among underrepresented populations. Some of the aforementioned studies have used the HBM among African-American populations (Crosby, DiClemente, Wingood, Sionean, Harrington, Davies et al., 2001; Ford, Jaccard, Millstein, Bardsley et al., 2004; T. Kershaw et al., 2004; Sydney et al., 2000), however, a closer examination of studies that have assessed the utility of the HBM with these populations will be beneficial in understanding how to approach further research concerning STD testing behaviors.

Some of the areas of recent study regarding use of HBM constructs have focused on cancer screening or HIV-risk behaviors among African-American populations. A study conducted by James, Campbell, and Hudson (2002) assessed perceived barriers and benefits regarding colorectal cancer screening (CRC) among African-American adults in a church health promotion program. Results indicate that perceived barriers were associated with fecal occult blood testing (FOBT) while perceived benefits were associated with having had a colonoscopy (James, Campbell, & Hudson, 2002). The findings of this study were interpreted by comparing these results to the Janz and Becker (1984) article which found that barriers was the construct that was most significantly associated with preventive health behaviors whereas perceived

benefits seem to be a more important factor for sick-role behavior (James et al., 2002). For this reason, FOBT in this population appears to be a preventive health behavior where perceived barriers played the strongest role in predicting screening behavior and a colonoscopy emerges as an early detection or sick-role behavior where perceived benefits play a powerful role (James et al., 2002). As a whole, assessing perceived barriers and benefits regarding CRC in this African-American population proved to be a successful use of the HBM and thus demonstrates that it can be appropriately used in this population.

Another study performed by Ashing-Giwa (1999) investigated the use of health behavior change theories and their socio-cultural relevance for breast cancer screening in African-American women. This article reviewed the HBM and its applicability in this population. This critical review discovered that the constructs of perceived susceptibility, severity, barriers, and cues to action are useful in explaining some beneficial influences of breast cancer screening behaviors in African American women (Ashing-Giwa, 1999). However, Ashing-Giwa mentions that conceptualizations of these constructs should be presented within the proper socio-cultural contexts. For instance, perceived barriers should reflect economic and historical obstacles to health practices, and perceived susceptibility and severity may not be as salient among African Americans where individual risk may not influence behavior change as much as "group susceptibility". Thus, the HBM can be even more essential to explaining behaviors among African-Americans if appropriate socio-cultural contexts and other ethnic experiences are applied to the model.

Neff and Crawford (1998) took a similar approach to understanding the utility of the HBM among racial/ethnic populations, but used this analysis to assess HIV risk behaviors. It has been postulated by others that race/ethnicity is an important factor in the HBM because it

represents a value-expectancy theory behavior where rational individuals weigh the costs and benefits in an attempt to maximize gain (Neff & Crawford, 1998). Nonetheless, the HBM assumes that all people exist in similar cultures and have similar control of their environments, which for HIV behaviors, may or may not be true (Neff & Crawford, 1998). In understanding HIV risk behaviors, one must first understand how the environment shapes choices and opportunities as well as how these opportunities, tasks or competencies define an individual's daily existence (Neff & Crawford, 1998). Thus, Neff and Crawford also agree with Ashing-Giwa that socio-cultural influences of historical and structural circumstances are not captured in the HBM which is the reason for conducting analyses to determine its applicability among racial/ethnic populations.

As a result, the Neff and Crawford study examined a causal model including perceived seriousness, susceptibility and barrier components with HIV risk behaviors among over 1200 adults (57% female; 32% White, 23% African American, 45% Mexican) who reported drinking at least two or three times a month in San Antonio, Texas (Neff & Crawford, 1998). Results indicated that a causal model of the HBM was able to link demographic and perception variables with HIV risk behaviors. On the other hand, ethnic differences in the HBM demonstrated that the affects of barriers and susceptibility appear more relevant to Whites and Mexicans than to African Americans (Neff & Crawford, 1998). Limitations of the study did reveal that low levels of reliability of the HBM concepts may have played a role in these ethnic differences. However, understanding racial differences in HBM constructs may prove to be beneficial in further analyses. So, the HBM appears to be applicable for diverse populations, nonetheless, improved validation of HBM constructs among African-Americans and the inclusion of socio-cultural variables in these components is an area that needs to be further explored.

Modified Model for the Study

In 1994, Rosenstock, Strecher, and Becker summarized the HBM components into three key categories. These categories are background, perceptions, and action (Figure 3.2) (Rosenstock et al., 1994). Previous categories of the HBM included individual perceptions, modifying factors, and likelihood of action. These researchers used this latest model framework as a more convenient method to explain HIV risk behaviors. Accordingly, the theoretical framework for this study will utilize this modified HBM to explore predictors of STD testing behaviors.

Selected background variables were chosen for the current study that attempts to examine factors that have been previously studied regarding STD-risk behaviors and reflect patient characteristics that may influence STD testing behaviors. Since the main purpose of this study is to explore these variables in relationship to two STD testing outcomes, the utility of the HBM model will not be tested in this investigation. Nevertheless, the literature reviewed will be helpful in explaining the trends and relationships that will be revealed through data analyses.

The theoretical framework that will drive the analyses for this study is modified from the Rosenstock article (1994). The proposed theoretical model (Figure 3.3) includes the following predictor variables that will used to assess STD testing behaviors: background factors –socio-demographic, psychosocial, and health-related factors; perceptions (perceived risk, perceived severity, perceived benefits and perceived barriers); and, action (desired health behavior).

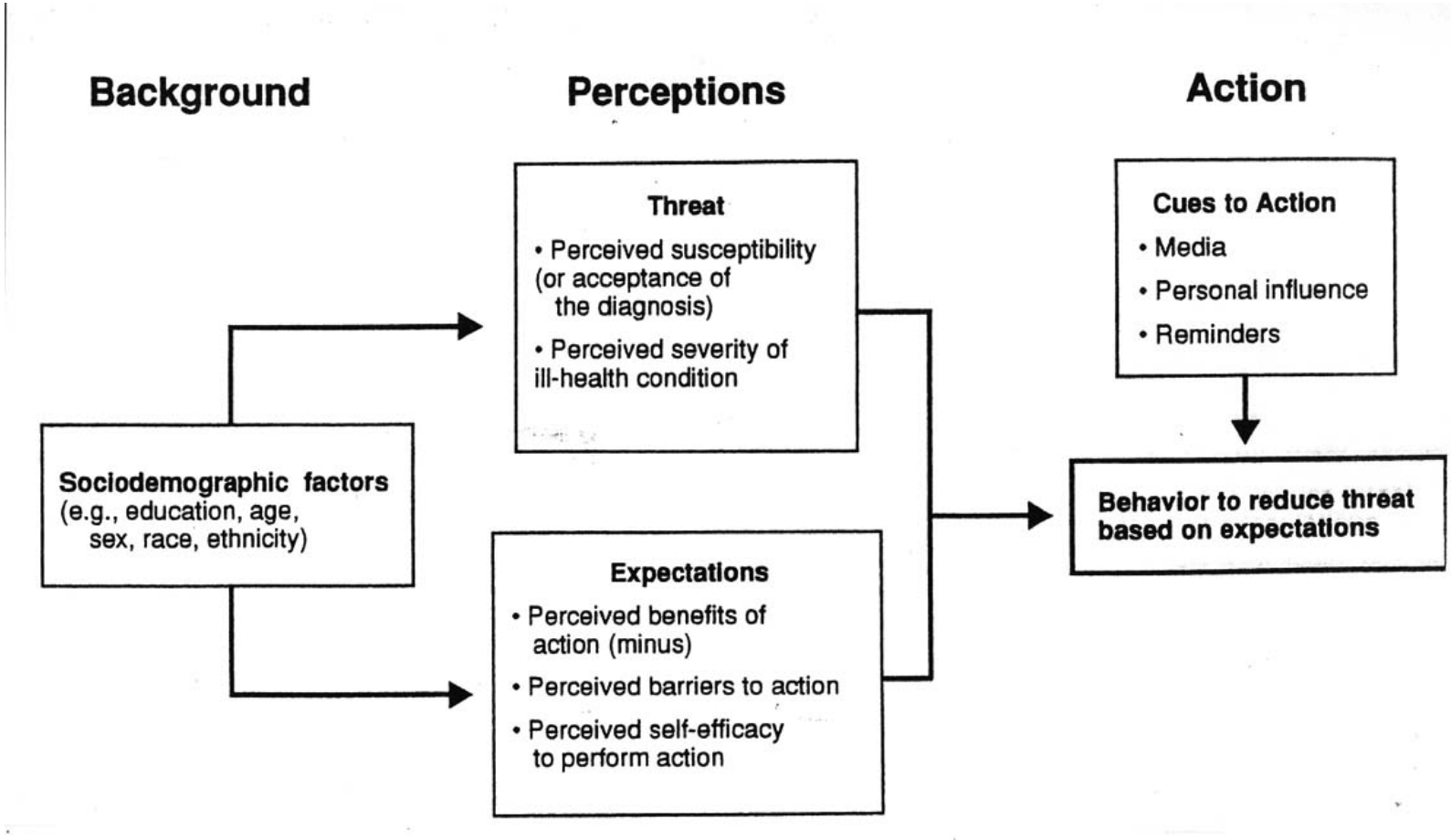

Figure 3-2 Schematic Design of the Components of the Health Belief Model (Rosenstock, Strecher, & Becker, 1994)

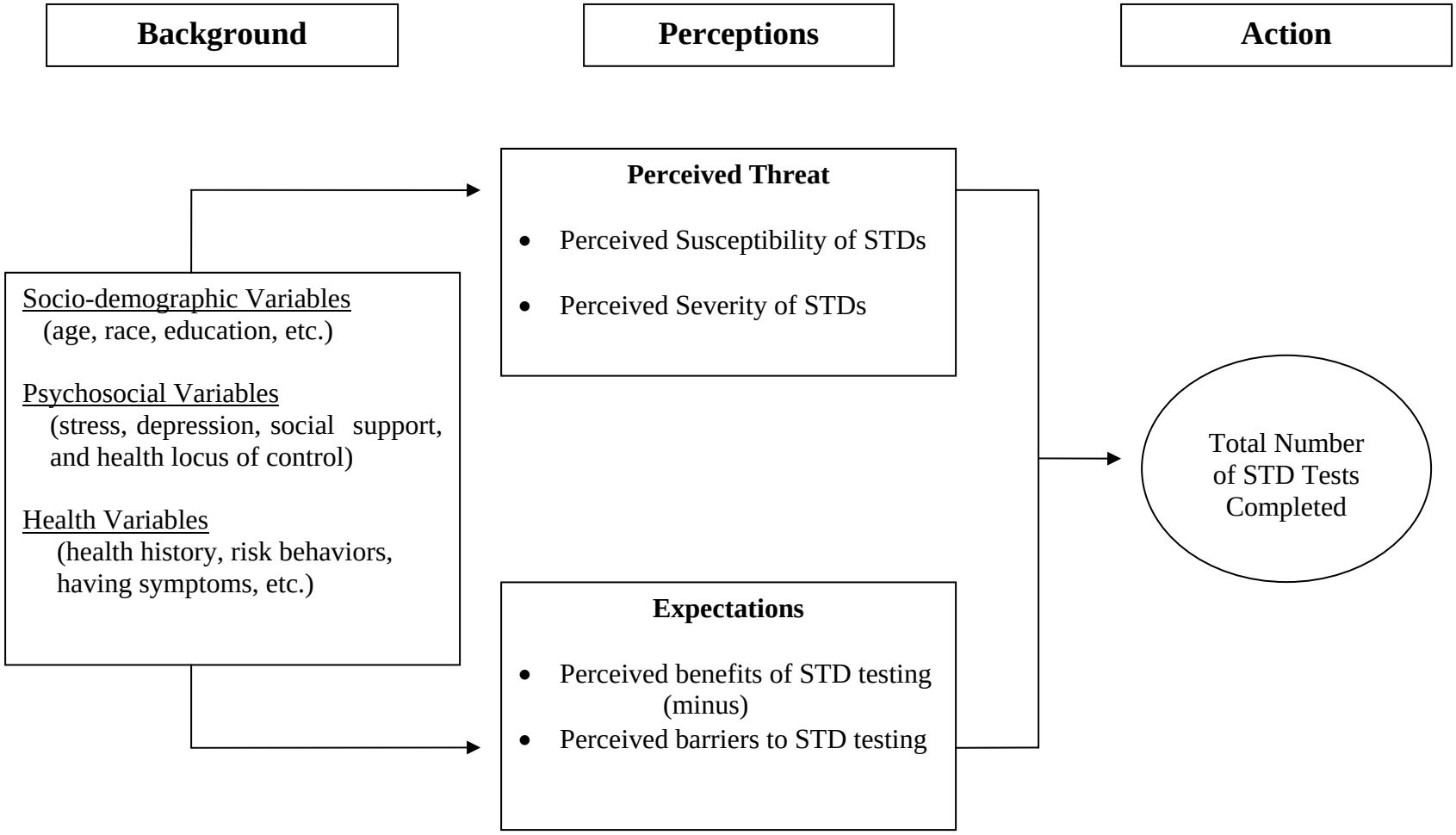

Figure 3-3 Modified Schematic Design of the Components of the Health Belief Model

A review of the literature suggests that there are gaps in knowledge regarding STD testing behaviors of young women. Based on the paucity of research concerning STD testing behaviors, the proposed study will be crucial in understanding background and perceptions that may influence behavior. Thus, it is postulated that young women will engage in STD preventive-behaviors if: they regard themselves as susceptible to Chlamydia or gonorrhea, if they believe it would have potentially serious consequences, if they believe that STD testing would be beneficial in reducing their susceptibility to, or the severity of, STDs and, if they believe that the anticipated barriers to (or costs of) taking the action are outweighed by the benefits.

4. CHAPTER IV

4.1. METHODOLOGY

This chapter describes the methodology used in this study, including the: (1) source of data, (2) data collection methods, (3) study variables, (4) data analysis, and, (5) the limitations of the study. This study was approved as "exempt" through the University of Pittsburgh Institutional Review Board – IRB # 0506038.

4.1.1. Data Source

This study utilized baseline and follow-up data from the Detection Acceptability Intervention for STDs in Young women (DAISY) project. The Principal Investigator for this study is Dr. Roberta B. Ness, Chair of the Department of Epidemiology at the University of Pittsburgh Graduate School of Public Health and Professor of Epidemiology at this institution. My research preceptor is Dr. Robert Cook who is the Co-Investigator of the DAISY project and is an Assistant Professor of Medicine at the University of Pittsburgh School of Medicine. The DAISY project was designed based on results from several preliminary studies regarding STDs conducted by Ness and others which found that self-testing for STDs (where a young woman collects a test sample herself) could reduce potential barriers to STD testing and thus increase a young woman's willingness to seek Chlamydia testing.

The DAISY project utilized a randomized, clinical trial study design with two specific aims. The first of which is to: (1) evaluate the effectiveness of home sampling for increasing adherence to screening at six month intervals and, (2) to compare the number of lower genital tract infections detected in a home screening group and return visit group. Secondary aims of the study include: (1) a comparison of the number of lower genital tract *Neisseria gonorrhoeae* infections detected in a home screening group and return visit group; (2) a comparison of rates of treatment for detected chlamydial and gonococcal infections between groups; (3) a comparison

between groups, of the proportion of women who had pelvic inflammatory disease (PID) diagnosed during the study; (4) a comparison of the prevalence of Chlamydia at the end of screening between groups; and, (5) an assessment of attitudes toward STD screening. Hence, the present investigation will be helpful in examining STD testing behaviors in relation to the fifth aim.

The DAISY study has 403 young women as participants in the study. Approximately half (n = 202) of the participants were recruited from one of nine participating clinical settings in Pittsburgh, Pennsylvania after being diagnosed with an STD (i.e. Chlamydia, gonorrhea, or trichomonas). The remaining half of the participants (n = 201) were recruited in the community via advertisements. All participants in the DAISY project were between 14 and 29 years of age. A waiver of parental consent for participants aged 14 to 17 years old was granted.

Study Population

The study population for this exploratory research consists of 171 young women in the DAISY project who has completed their two year participation in the study. Data from baseline, follow-up, and chart abstractions is used for the data analyses. Although the original sample of DAISY participants is 403 young women, this study focuses on those participants who have completely finished the two-year study period.

Recruitment

Women were recruited for the DAISY project either through provider referral, posted advertisements in participating clinics or in the community, or by referrals from friends. Women could answer advertisements by calling a toll-free number to learn about the study or contact study recruiters if referred by providers or clinics. Eligibility criteria included: females ages 14 to 29 years old, being sexually active, and willing to participate. Additional requirements

included meeting at least 3 of 5 criteria known to increase the risk of acquiring an STD. These criteria are: being ≤ 20-years-old, living in a high-risk neighborhood, Black race/ethnicity, participation in regular douching, and having had > 1 sexual partner. High-risk neighborhoods were identified as areas with high rates of Chlamydia and gonorrhea as determined by statistics of the Allegheny County Health Department in Pittsburgh, PA. Women were excluded from the study if they are: (a) pregnant (pregnant women have different screening recommendations); (b) homeless (unable to obtain a home sampling kit); (c) married (married women do not have a high risk of acquiring an STD); or (d) currently being examined for gynecological infections more than once a year (may not benefit from home sampling and not generalizable to study outcomes).

If a young woman met the inclusion criteria, she was consented and enrolled in the study. These women were also sent additional brochures to give to friends. If friends enrolled in the study, participants received $10 for every friend enrolled. After enrollment, women completed a baseline instrument. All participants provided written informed consent as approved through the Institutional Review Board at the University of Pittsburgh and participating hospital-based clinics.

4.1.2. Data Collection Methods

Female interviewers conducted in-person or telephone interviews using a standard consent procedure and baseline questionnaire. The baseline survey took approximately 15 to 20 minutes to complete. Information on the baseline questionnaire captures 12 categories: (1) demographics; (2) general health; (3) stress; (4) mood (depression); (5) social support; (6) abuse; (7) alcohol use; (8) substance use; (9) history of STDs; (10) attitudes toward screening; (11) health locus of control; and (12) sexual behavior. In addition to administering the baseline survey, participants recruited from the community have a baseline Chlamydia and gonorrhea test.

Women who completed a telephone interview were mailed their consent forms and instructed to return it to research assistants. These participants also completed a vaginal swab self test for a baseline STD test. This test could have either been mailed to the participant or picked up at a participating clinic. Participants also chose a participating clinic to receive follow-up care. After the consent form and baseline questionnaire were completed, the participant was assigned a clinic identifier and this information was stored in a locked cabinet. Next, the participant underwent the intervention/control randomization process.

A schematic diagram of data collection procedures for the overall DAISY study is provided. (Figure 4.1).

Baseline Questionnaire

The baseline questionnaire for the DAISY project was developed by Cook and others based on preliminary studies conducted concerning alcohol use and STDs. The surveys used for these studies were administered to college students in Pittsburgh, PA (Barth et al., 2002). Thus, the survey has been pilot tested numerous times and used in populations of college women. Specific categories of the baseline survey will be discussed later.

Intervention

After completion of the consent process and baseline survey, participants were randomized to either the home testing group or return visit group. During the baseline interview, women were told to expect 6, 12, and 18 month reminders to return to a clinic for screening or that they will receive a home sampling kit (based on group assignment).

For the clinic testing group, women received a reminder, enclosed in a sealed envelope, to return for STD testing. During the return visit, a standardized protocol was followed where

women underwent a pelvic examination with a vaginal swab specimen collected that was tested for Chlamydia and gonorrhea. Regular clinical care was also provided, if needed.

For the home sampling group, women either had the Chlamydia/gonorrhea kit mailed to their home or arranged to pick it up. The home testing kit contained a swab (similar to a Q-tip), a small vial of media, instructions on how to collect the sample, and a mailing tube. Instructions told participants to insert the swab about one inch into the vagina for approximately 15 seconds. Then they were instructed to remove it, place it in the vial, seal it, and place it in the postage-paid mailing tube.

Biological STD testing Data Collection

Collection of swab samples by the provider and by home testing participants went through a strand displacement amplification assay. This assay (BDPROBE TecJ, Becton Dickinson Sparks, MD) was used to detect Chlamydia and gonorrhea from the genital specimens. Swab samples can be stored at 2 to 30 degrees Celsius for up to 14 days with no loss of test sensitivity. The clinical specimens were express mailed to the Infectious Disease Laboratory at Magee-Womens Research Institute in Pittsburgh, PA for analysis.

All laboratory results were available in 48 hours. The research assistant to the DAISY study contacted participants with a positive test result. Then, the research assistant either called in an antibiotic treatment at a local pharmacy for the participant or had them return to a clinic for free antibiotic treatment (based on insurance status and patient preference). Women who could not be contacted about their positive test results were sent a certified letter to return for treatment. Treatment for Chlamydia included doxycycline and treatment for gonorrhea was ceftriaxone which are recommended drug regimens by the 1998 CDC guidelines (CDC, 1998). In addition, protocols for disease reporting to the health department were also followed.

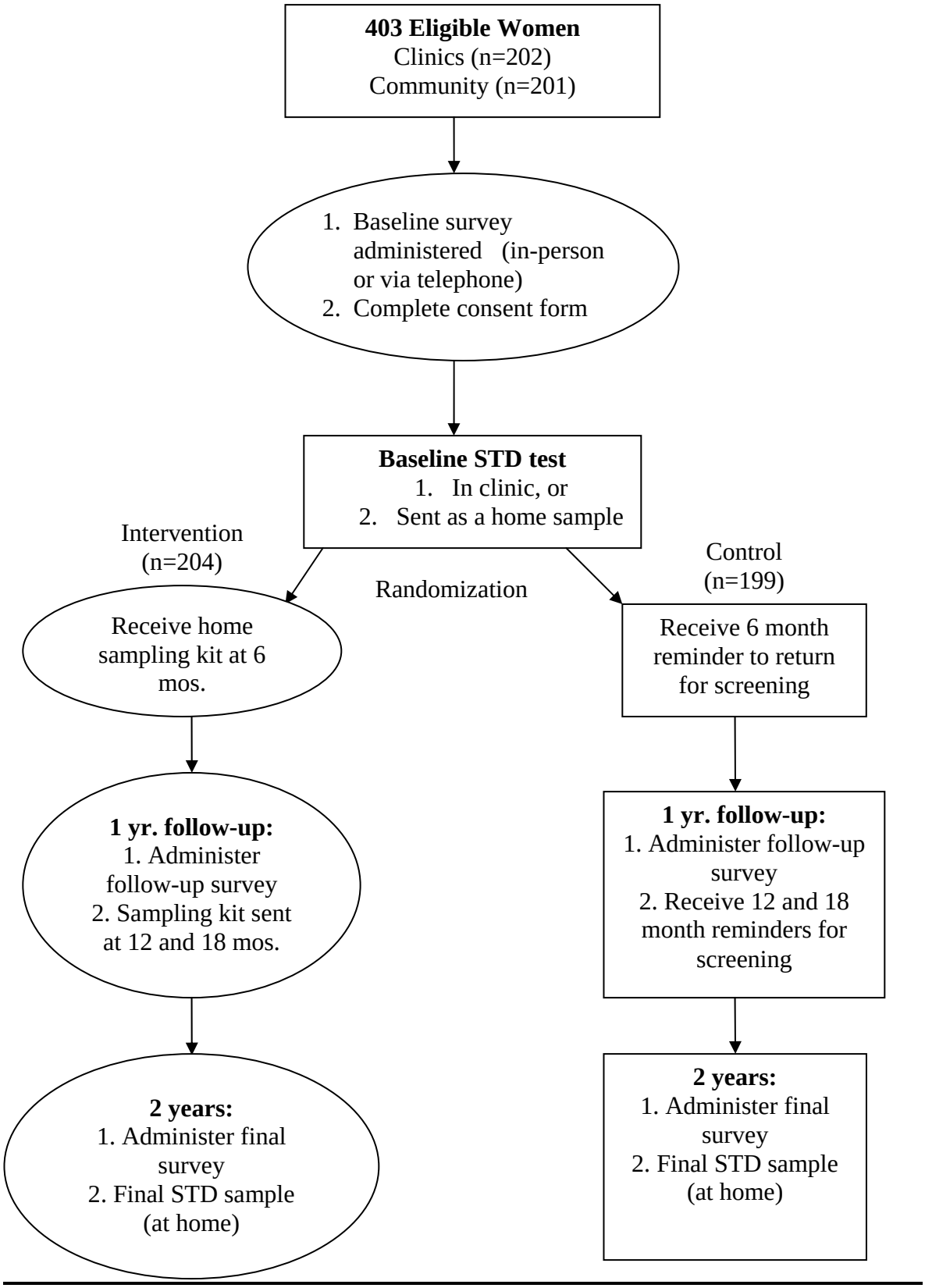

Figure 4-1 Schematic Diagram of Data Collection Procedures

One year and Two-year Follow-up Data

One year after enrollment, participants were contacted to answer a brief follow-up questionnaire. This questionnaire inquired about STD-related medical history, number of pelvic exams received in the past year, and pregnancy information. Participants were paid $10 for return of this survey. In addition, contact information was obtained again just in case the participant has changed her address.

Two years after enrollment, participants were contacted regardless of how many screening tests they had completed. At this time, all participants were mailed or picked up a home sampling test to be mailed for STD analysis. The purpose of the final test was to compare the prevalence of Chlamydia in the intervention group versus the control group.

A final interview was also completed over the telephone. This interview: (1) assessed the evidence of other STDs or PID diagnoses; (2) repeated alcohol and substance use questions; (3) assess clinic use in the past two years of the study; (4) enumerated pregnancies; (5) asked about pap tests and breast exams in the past year; (6) assessed STD-preventive behaviors; and (7) assessed the opinions of the home testing group. Women who saw a provider for a health-related complaint or exam were asked to provide release of information so that medical records could be reviewed.

Medical chart abstractions collected information on: (1) reason for office visit; (2) patient symptoms; (3) physical exam results; (4) laboratory testing – STDs, pap, vaginal wet mount; (5) pharmacy report; (6) possible ultrasound results; (7) urinalysis; and (8) pregnancy information.

To ensure completion of the second year STD test, a second mailing occurred along with a $2 incentive to return the test. In addition, follow-up interviews for the last interview occurred as well as contacting friends and relatives to locate the participant.

4.1.3. Study Variables

Background variables and perceptions (predictor) and outcome variables for the current study were either extracted or developed from the baseline DAISY survey. Preliminary analyses assisted with identifying predictor variables for inclusion in the larger analysis. Moreover, a set of factor analyses were completed to create perception variables that were more parsimonious with their meanings. Outcome variables were selected based on suggestions from the literature for further research and the ability to complete some of the secondary aims of the DAISY project. The operational definitions of predictor variables are consistent with definitions given for similar variables in the literature reviewed. The measurement of independent and dependent variables will be explained below.

Predictor Variables

AGE

Age was assessed by asking participants their date of birth.

RACE

The following questionnaire item was used to assess the race or ethnic group of the participant: “What race or ethnic group do you consider yourself a part of? Responses offered were Black or African-American, White, Hispanic, Asian/Pacific Islander, Native American/Alaskan Native, and Other (specify).

EDUCATION

The following questionnaire item was used to assess the educational level of the participant: “What was the highest grade of school you completed? Responses to this question were none, some grade school (1-6yrs), some junior high (7-9 yrs), some high school (10-11

yrs), high school graduate/GED, post high school training or technical school, some college/associate degree, and college graduate/post-graduate.

ATTEND RELIGIOUS SERVICES OR NOT

The following questionnaire item was used to assess whether or not participants attend church services: "Do you go to church or attend a religious service at least once a week on most weeks?" Yes (1) or no (0) responses were given.

AGE OF FIRST SEXUAL INTERCOURSE

The following questionnaire item was used to determine the age of participants at coital debut: "How old were you when you had sexual intercourse for the first time?" Respondents gave the age for this question.

STRESS

Stress was assessed using the perceived stress scale (PSS) which is a four-item scale that measures the degree to which situations in one's life are appraised as stressful during the past month (S. Cohen, Kamarack, & Mermelstein, 1983). An example questionnaire item used was, "During the past month, how often did you feel that you were unable to control the important things in your life?" The responses for this item ranged from 0 (never) to 4 (very often).

MOOD

The mood of study participants was assessed using the Center for Epidemiologic Studies Depression Scale (CES-D). This short self-report scale (20 items) was designed to measure current level of depressive symptomatology in the general population (Radloff, 1977). An example questionnaire item used was, "You were bothered by things that usually don't bother you." The responses for this item ranged from 0 (rarely or none of the time – less than one day) to 3 (most or all of the time – 5 to 7 days).

SOCIAL SUPPORT

Perceived social support was assessed using 5 items regarding how often participants have family or friend support for various situations (Ren, Skinner, Lee, & Lewis, 1999). An example questionnaire item used was, "How often do you have a family member or friend that you can confide in or talk to about your problems?" The responses for this item ranged from 1 (none of the time) to 5 (all of the time).

HEALTH LOCUS OF CONTROL

The health locus of control for study participants was determined by 9 items modified by Kelly and researchers (1990) which reflect three dimensions of the original Health Locus of Control Scale. The three dimensions are: internal control (sample item: "If you take the right steps, you can avoid getting a sexually transmitted disease"), chance or luck – external control (sample item: "If you get a sexually transmitted disease, it's a matter of fate or bad luck"), and powerful others – external control (sample item: "Other people play a big part in whether you get a sexually transmitted disease") (Kelly et al., 1990). The responses for these items ranged from 1 (strongly disagree) to 5 (strongly agree).

PAST STD HISTORY

A previous STD history was determined by asking participants, "Has a doctor or health worker ever told you that you had: Chlamydia, gonorrhea, PID, bacteria vaginosis (BV or gardnerella), trichomonas (or trich), genital warts (human papilloma virus or HPV), genital herpes, HIV or AIDS, syphilis (or "bad blood"), vaginal yeast infections, or crabs (pubic lice)?" Yes (1) or no (0) responses were given for this item.

PAST HISTORY OF SEXUAL ABUSE

The following questionnaire item was used to determine whether participants had a history of sexual abuse: "During your childhood or adolescence, did your parent or person who raised you or anyone else you lived with ever force you to have sex against your will? By sex, I mean touching your sexual parts, you touching their sexual parts, or sexual intercourse? Yes (1) or no (0) responses were given for this item.

CURRENT ANTIBIOTIC USE

The current use of antibiotics was assessed by asking participants, "Are you currently taking or did you take antibiotics for your most recent (Chlamydia or gonorrhea) infection?" Yes (1) or no (0) responses were given for this item.

SYMPTOMS OF AN STD

The following questionnaire item was used to determine whether participants had symptoms of an STD at baseline: "When you went to the clinic on that visit, did you have symptoms of an infection such as vaginal itching, burning, or abnormal discharge or bleeding?" Yes (1) and no (0) responses were given for this item.

CONDOM PROBLEMS

The following questionnaire item was used to determine whether participants had any condom problems in the past 6 months: "If YES to condoms, in the past six months, have you had any of the following problems when using condoms?" The responses offered were: the condom broke or ripped (1); the condom slipped or fell off (2); the condom was put on inside out and flipped over (3); the condom was put on halfway through sex, after the penis had been in the vagina (4); the condom was removed halfway through sex (5); tried to use a condom, but couldn't put it on (6); other condom use problem (7); none of the above (8).

DOUCHING BEHAVIOR

The following questionnaire item was used to determine douching behaviors of participants: “Do you douche at least once a month (that is, squirt a liquid into your vagina)?” Yes (1) and no (0) responses were given for this item.

NUMBER OF SEXUAL PARTNERS (IN THE PAST YEAR)

The number of sexual partners in the past year for each participant was assessed by asking, “During the past year, with how many different partners did you have sexual intercourse?” A number was given for this response.

ALCOHOL USE

The use of alcohol in the past year was assessed by asking, “How often do you have a drink containing alcohol?” Responses given for this item were: (1) monthly or less; (2) two to four times a month; (3) two or three times a week; (4) four or more times a week.

CIGARETTE USE

The following questionnaire item was used to determine whether participants smoked cigarettes or not: “Do you currently smoke cigarettes?” Yes (1) or no (0) responses were given for this item.

MARIJUANA USE

The following questionnaire item was used to determine whether participants ever used marijuana or not and the frequency of their use: “If you have ever used marijuana or pot, how many times in the past month have you used it?” Numerical responses were given for this item.

Perceptions

The perceptions regarding STDs were assessed using 4 components of the HBM. These items were originally developed by researchers in the DAISY project. However, the original

items were used in a factor analysis model to make these questionnaire items fit more parsimoniously with the constructs of the HBM. The procedures and results of the factor analyses and other reliability tests completed are discussed later in the methodology section.

PERCEIVED SUSCEPTIBILITY

Perceived susceptibility was originally assessed by asking respondents a set of 5 questions. Factor analyses determined that 2 items measured perceived risk of an STD as more related to one another. These items are: "You can generally tell if your sexual partner has an STD" and "You can tell if you have an STD". The responses for these items ranged from 1 (strongly disagree) to 6 (strongly agree).

PERCEIVED SEVERITY

Perceived severity of an STD was initially assessed by 2 items. Factor analyses determined that one of these items seemed to measure perceived severity of STD the best. This questionnaire item was: "Getting Chlamydia and gonorrhea infection might make you unable to get pregnant". The responses for these items ranged from 1 (strongly disagree) to 6 (strongly agree).

PERCEIVED BENEFITS

Perceived benefits of STD testing was determined by asking respondents the following questionnaire items, "You would want to know if you had a STD in the future"; "Treating a STD early, instead of waiting, is more likely to prevent future problems"; "You would want to be tested in 6 months to be sure that nothing was wrong"; and "It is important for you to be tested so you won't infect someone else". The responses for these items ranged from 1 (strongly disagree) to 6 (strongly agree).

PERCEIVED BARRIERS (HARMS)

Perceived barriers to STD testing were originally assessed by asking respondents 6 items. However, 8 additional questions were added regarding barriers to STD testing procedures and clinical factors. Factor analyses were performed on all these items and 2 types of barriers emerged from this analysis. Individual barriers to STD testing are determined by asking participants the following 8 questionnaire items: “People might think you were a bad person if they knew you were getting tested for a STD”; “Getting checked for a STD by a pelvic exam is embarrassing”; “You would feel stupid if you caught a STD”; “You would worry that people who live with you would find out you had a STD”; “You are afraid of pain during a pelvic exam”; “You don’t like to have someone examine your vagina, genitals, or private parts”; “Most people think STDs are disgusting”; and “Most people look down on someone with a STD”. These last two items are considered to measure *stigma* associated with individual perceptions of barriers to STD testing.

Test procedure barriers were assessed by asking respondents 3 items: “You would be more likely to get a STD test if you could do it yourself”; “It is hard to find time to get checked for a STD”; and “You worry that someone you know will see you in the waiting room when getting a STD test”. The responses for both perceived barrier measures ranged from 1 (strongly disagree) to 6 (strongly agree).

Outcome Variable

TOTAL NUMBER OF STD TESTS COMPLETED

The outcome variable *total number of STD test completed* was assessed by participants’ STD testing behaviors throughout the DAISY project. These behaviors were enumerated from

the return of home sampling kits (if the participant is in the intervention group), follow-up surveys and chart abstraction data.

4.1.4. Data Analysis

The following section discusses the statistical procedures used in the current study. All analyses were performed using Statistical Program for the Social Sciences (SPSS, version 12.0 for Windows) and STATA (Intercooled versions 8.0 and 9.0 for Windows).

Development of Measures

A discussion regarding the rationale for the use of specific measures and the development of perception variables is warranted in this study. Due to the fact that this study is exploratory, many of the measures were created to fit the data well and appropriately measure intended domains. Thus, the following is a description of these measures and their operationalization for this study.

PSYCHOSOCIAL VARIABLES

The psychosocial variables utilized in this study (stress, depression, social support, and health locus of control) are all valid and reliable measures that have been used in published studies in peer-reviewed journals. The cognitive variable of stress is being measured using the perceived stress scale that was originally developed by researcher, Sheldon Cohen, in the 1970s. Since then, the perceived stress scale has been used in many academic disciplines, including areas that explain health behavior. The original perceived stress scale included 14 items; however, this study will use the validated 4-item scale (S. Cohen & Willamson, 1988). Prior studies demonstrate that this 4-item scale has adequate reliability to be a useful measure of perceived stress for situations requiring a brief scale. The alpha reliability coefficient that is seen for this scale is 0.60. Higher scores of stress indicate higher perceived stress.

The scale used to measure depression is the CES-D Scale which is a widely used depression scale developed by researchers at the National Institute of Mental Health. This scale consists of 20 items and has reliability and validity among adult and adolescent populations. Internal consistency reliability is generally in the 0.80 to 0.90 range (Radloff, 1991). Higher scores indicate higher levels of depression.

Perceived social support was measured on 5-items and determined how often, in general, the participant perceived that she had support from her family or friends. A prior study used this scale in a representative sample of citizens in the US and found the reliability coefficient to be 0.71 (Ren et al., 1999). Higher scores indicate more perceived social support.

The last psychosocial variable being measured is health locus of control. The original health locus of control scale was developed by Wallston and researchers in the 1970s and was a unidimensional scale (Wallston, Wallston, & DeVellis, 1978). The scale used in this study was multi-dimensional and adapted from a nine item scale used to investigate HIV counseling effects (Ickovics et al., 1998). The three dimensions of the scale are internal health locus of control (the individual having control of whether they acquire an STD or not), powerful others locus of control (whether or not the individual gets an STD is determined by other people), and chance health locus of control (if the individual gets an STD, it is a matter of fate or bad luck). Previous studies have used the multidimensional health locus of control scale in different populations. Within the Ickovics study, this variable had a reliability coefficient (Cronbach's alpha) of 0.55 (Ickovics et al., 1998).

PERCEPTIONS

An exploratory factor analysis was conducted on the 28 questionnaire items that assessed various perceptions regarding STDs and STD testing. The purpose of exploratory factor analysis

is to investigate the relationships among perception variables and to create more parsimonious and reliable measures for these domains (Thompson, 2004). More specifically, exploratory factor analysis computes a matrix of coefficients where the coefficients refer to the correlations between factors and variables (Kim & Mueller, 1978). Factors can be hypothesized, unmeasured, or underlying variables which are presumed to be the sources of the observed variables (Kim & Mueller, 1978). For this study, the factors will be the four main constructs of the HBM (perceived risk, severity, benefits, and barriers) which will be correlated with the original 28 variables. So, this statistical process will be helpful to determine the validity of the original items to correctly measure the HBM components. In addition, a reliability coefficient (Cronbach's alpha) was computed to determine the degree of consistency in which the instrument measures the HBM constructs and also validates the results of the factor analyses. The main assumption for factor analysis is that relationships between variables can be represented by a correlation coefficient. This is true for the current exploratory study.

In an exploratory factor analysis, usually the three main steps are: (1) preparing an appropriate covariance matrix; (2) extraction of initial factors; and (3) rotation to a terminal solution (Kim & Mueller, 1978). To address steps one and two for this study, the original 28 items used to measure components of the HBM were entered into an exploratory factor analysis application using an extraction method called the principal components analysis. This analysis examines the interdependence among the variables and hypothesizes the minimum number of common factors that would be needed to reproduce the observed factors. In addition, this analysis is used to account for as much variance as possible in the data by using eigenvalues (a mathematical property of a matrix) and cumulative percentages.

Since the purpose of this factor analysis was to determine which questionnaire items fit the four components of the HBM, the initial principal components analysis extracted 5 components for explanation and eliminated factors in the component/covariance matrix with correlation values less than 0.30 – criteria set to exclude relationships that were not strong (See Figure 4.2). A table showing the variance of these components to the data was also given (See Figure 4.3).

Based on the most widely used criterion of determining the number of components that are important for extracting in a principal component analysis (eigenvalues greater than 1 in the table variance – Figure 4.3), this result revealed that there were 10 components that were significant concerning this analysis and accounted for 58% of the total variance. Yet, the extraction of 5 components explained approximately 37% of the total variance in the data. To validate the decision to extract only 5 components, a graphical test called a scree plot test was also used to determine the number of component factors that should be extracted to create more parsimonious measures – point where eigenvalues begin to level off forming a straight line (See Figure 4.4). This test demonstrated that no more than 5 components should be extracted.

To address step three, another principal component analysis was employed that used varimax rotation to determine a terminal solution to this application (Figure 4.5). Varimax rotation simplifies the factor structure by maximizing the variance of a column of the pattern matrix (Kim & Mueller, 1978). After completing this 5 component analysis, another analysis was employed that removed 2 items which did not fit any of the 5 components extracted ("Catch STD year" and "Most people think STDs are no big deal"). A final component matrix for this analysis can be seen in Figure 4.6. The data were reduced because these 2 items did not appear to measure something within the 5 components.

Component Matrix(a)

	Component				
	1	2	3	4	5
Catch STD year					-.356
STDs symptoms		.596			
Tell partner has STD		.617	-.385		
Tell if you have STD		.793			
No STD if use condom		.386			.455
STDs aren't serious			-.387		
Want to know if had STD			.471	.423	
Treating STD helps prevent future problems			.390	.336	
Tested again in 6 months		.339	.406		
Test to not infect others			.569		
Bad for getting tested	.553				
Pelvic exams embarassing	.577				
Stupid if caught STD	.415				.369
Housemates find out	.560				
Pelvic exam pain	.391				
Partner would blame you	.341				-.324
Don't like exams	.579				
More likely test if done by self	.395		.352	-.459	
Hard to find time	.485			-.429	
Clinics confidential					.383
Getting to clinic is easy				.313	
Use home test		.347	.385	-.528	
Be seen in waiting room	.601				
Don't like to touch self in genital area	.320			.359	
Most people think STDs are no big deal					
Most people think STDs are disgusting	.320				
Most people look down on someone with STD	.451				

Extraction Method: Principal Component Analysis.
a 5 components extracted.

Figure 4-2 Original Principal Components Analysis

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.118	11.550	11.550	3.118	11.550	11.550
2	2.046	7.578	19.127	2.046	7.578	19.127
3	1.858	6.882	26.010	1.858	6.882	26.010
4	1.567	5.803	31.812	1.567	5.803	31.812
5	1.400	5.184	36.996	1.400	5.184	36.996
6	1.306	4.835	41.832			
7	1.218	4.510	46.342			
8	1.131	4.189	50.531			
9	1.084	4.016	54.547			
10	1.024	3.791	58.338			
11	.975	3.611	61.949			
12	.911	3.374	65.322			
13	.862	3.192	68.514			
14	.826	3.060	71.574			
15	.794	2.940	74.514			
16	.774	2.868	77.382			
17	.734	2.718	80.100			
18	.696	2.576	82.676			
19	.678	2.512	85.188			
20	.619	2.291	87.479			
21	.614	2.274	89.754			
22	.537	1.989	91.742			
23	.504	1.865	93.607			
24	.489	1.812	95.419			
25	.468	1.733	97.152			
26	.410	1.520	98.671			
27	.359	1.329	100.000			

Extraction Method: Principal Component Analysis.

Figure 4-3 Component Variance

The next step in the factor analysis application was to decide which components measured which construct of the HBM using the final component matrix (Figure 4.6). This decision was made based on the questionnaire item and high factor loadings on the component matrix. For **component 1**, many of the factor loadings weighted most heavily on questionnaire items associated with **perceived barriers of testing** (individual barriers of STD testing). When these items were placed in a reliability analysis, 10 major items emerged. An additional item measuring the possible stigma of getting an STD was also included in this analysis since the other stigma item loaded on this component. Overall, the reliability analysis for these 11 items yielded a Cronbach's alpha of 0.687 for individual barriers.

For **component 2**, the majority of the factor loadings were weighted on questionnaire items associated with **perceived susceptibility of STDs**. Although an original 5 items were used for this item, the factor and reliability analysis confirms that the 2 strongest items for measuring this variable was: "You can generally tell if your sexual partner has a STD" and "You can tell if you have a STD". This variable has been defined as perceived risk for the purposes of this exploratory study. A Cronbach's alpha of 0.674 was yielded for these 2 items.

For **component 3**, many of the factor loadings were on questionnaire items that assessed attitudes regarding STD testing. These items were then used in a reliability analysis. This analysis resulted in 4 items that appeared to best measure test/clinic barriers to STDs. The strongest. The reliability coefficient is 0.563 for these test/clinic barriers. These items are: "You would be more likely to get an STD test if test done by self"; "It is hard to find time to get checked for an STD"; "You would consider using an STD at home if one was available"; and "You worry that someone you know will see you in the waiting room when getting an STD test".

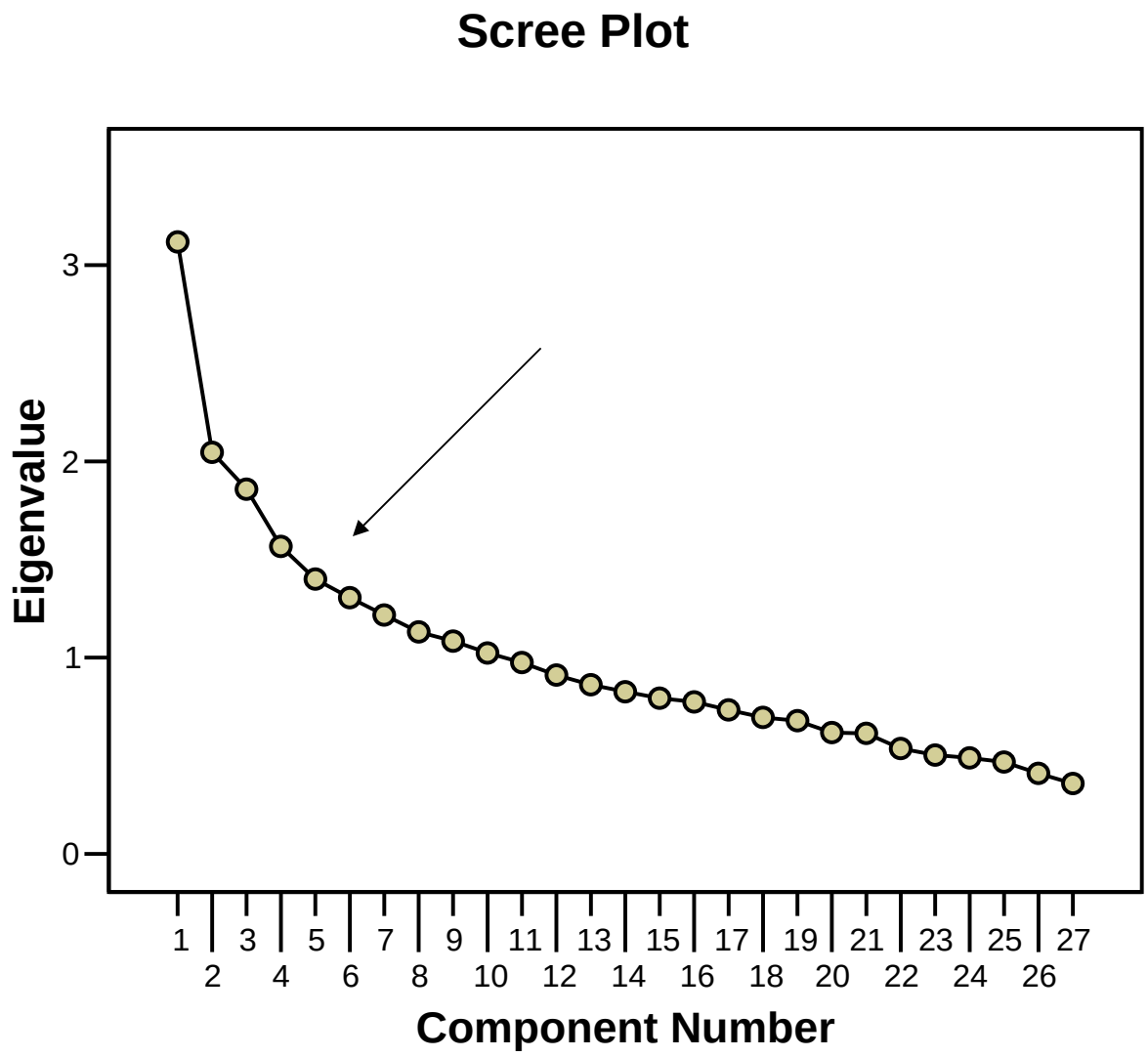

Figure 4-4 Scree Plot of Eigenvalues for the Original Principal Components Analysis

Rotated Component Matrix [a]

	Component				
	1	2	3	4	5
Catch STD year					
STDs symptoms		.605			
Tell partner has STD		.703			
Tell if you have STD		.827			
No STD if use condom		.417			
Clamydia or Gonorreha unable to get pregnant					.501
STDs aren't serious		.308			
Want to know if had STD				.600	
Treating STD helps prevent future problems				.455	
Tested again in 6 months				.615	
Test to not infect others				.715	
Bad for getting tested	.556				
Pelvic exams embarassing	.614				
Stupid if caught STD	.326				.347
Housemates find out	.562				
Pelvic exam pain	.399				
Partner would blame you	.348				
Don't like exams	.623				
More likely test if done by self			.673		
Hard to find time			.623		
Clinics confidential					
Getting to clinic is easy			-.470		
Use home test			.686		
Be seen in waiting room	.579		.319		
Don't like to touch self in genital area	.487				
Most people think STDs are no big deal					
Most people think STDs are disgusting					.663
Most people look down on someone with STD	.319				.506

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Figure 4-5 Principal Component Analysis after Varimax Rotation

Rotated Component Matrix [a]

	Component				
	1	2	3	4	5
STDs symptoms		.613			
Tell partner has STD		.720			
Tell if you have STD		.825			
No STD if use condom		.383			
Clamydia or Gonorreha unable to get pregnant					.473
STDs aren't serious		.351			
Want to know if had STD				.601	
Treating STD helps prevent future problems				.467	
Tested again in 6 months				.613	
Test to not infect others				.722	
Bad for getting tested	.559				
Pelvic exams embarassing	.615				
Stupid if caught STD	.326				.402
Housemates find out	.560				
Pelvic exam pain	.394				
Partner would blame you	.342				
Don't like exams	.627				
More likely test if done by self			.663		.308
Hard to find time			.637		
Clinics confidential					
Getting to clinic is easy			-.489		
Use home test			.683		
Be seen in waiting room	.584		.317		
Don't like to touch self in genital area	.493				
Most people think STDs are disgusting					.660
Most people look down on someone with STD	.332				.477

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

Figure 4-6 Principal Component Analysis for 5 Components – Removal of 2 Variables

For **component 4**, most of the factor loadings were on questionnaire items that examined **perceived benefits of STD testing**. All four of these items were used to measure perceived benefits and received a reliability coefficient (Cronbach's alpha) of 0.508. These items are: "You would want to know if you had an STD in the future"; "Treating an STD early, instead of waiting, is more likely to prevent future problems"; "You would want to be tested in 6 months to be sure that nothing was wrong"; and "It is important for you to be tested so you won't infect someone else".

Lastly, for **component 5**, many of the loadings did not appear to measure any specific construct of the HBM. Yet, the construct of perceived severity had not yet been determined. So, the initial 2 items used to measure perceived severity were examined. Decisions regarding the applicability of each item to the study and the weak loading for one of the severity items in another component, led to the creation of 1 item for perceived severity. Thus, **perceived severity** was measured using the question: "Getting a Chlamydia or gonorrhea infection might make you unable to get pregnant".

Components 1 and 3 were later combined to give a more complete measure of barriers to STD testing. Since they both had one questionnaire item in common, "You worry that someone you know will see you in the waiting room when getting an STD test", this created a perceived barriers measure with 13 items which yielded a Cronbach's alpha of 0.702. This was helpful to improve the reliability of the barriers construct since component 3 alone had a low reliability coefficient. The remaining 12 items for this barriers to STD testing are: "People might think you were a bad person if they knew you were getting tested for a STD"; "Getting checked for an STD by a pelvic exam is embarrassing"; "You worry that people who live with you would find out if you had an STD"; "You are afraid of pain during a pelvic exam"; "You don't like to have

someone examine your vagina, genitals, or private parts"; You would feel stupid if you caught an STD"; Most people think STDs are disgusting"; "Most people look down on someone with an STD"; "You would be more likely to get an STD test if you could do it yourself"; and "It is hard to find time to get checked for an STD".

OUTCOME VARIABLES

The outcome variable, "total number of STD tests completed", was used as a continuous variable in the analyses.

Analyses for Addressing Research Questions

Several analyses were conducted in this exploratory study and were approached from different statistical levels. The goal of doing this was to have a better understanding of all research variables for this study. The first type of analysis that was performed to address the proposed research questions was descriptive statistics. This included calculating means/medians, standard deviations, frequencies, and percentages. This information is essential in summarizing the distribution of the variables of interest in this study. In addition, univariate regression analyses were employed to determine each variable's association with perceptions or total number of STD tests completed.

The last analysis was a multivariate analysis. This analysis was used to determine which background and perception variables are associated with the outcome of interest. A stepwise multiple linear regression analysis was used. Linear regression is a statistical method that can be used to study the relationship of a continuous outcome variable with one or more predictor variables that may be either continuous or categorical variable(s) (Rosner, 2000). Additionally, the type of stepwise regression analysis used for this study was backwards selection which starts with all variables in the model and then removes them step by step according to their

significance to the outcome variable (Total number of STD tests completed). This model building strategy yields the best model that characterizes what impacts the outcome variable. Regression coefficients were used to interpret the results of this analysis.

For most analyses, p-values were computed. Since this was an exploratory study, p-values less than 0.10 were used as the cut-off for significance. This cut-off is less conservative than the usual cut-off of 0.05. However, due to the nature of the variables used and this being a secondary analysis, a less conservative significance level may be helpful in discovering factors which may reveal certain trends in the outcome of interest.

4.1.5. Limitations of the Study

There are several limitations to the research. First, this investigation is restricted to use of specific variables and certain analyses because this is a secondary data analysis. Development of measures and other issues related to types of research questions are maintained within the limits of the available data. Hence, the goals of this research are influenced by what data can be extracted from the baseline survey and other subsequent data collected as part of the DAISY project.

Second, the proposed exploratory study is a longitudinal study that is using cross-sectional data from which to draw conclusions. This means that data was collected at one point in time and thus direction of causation is not understood and must be interpreted from theoretical assumptions. Although using cross-sectional data to characterize longitudinal data limits the interpretation of the analyses, this study can still offer explanations for the relationships that exist among the baseline and outcome variables.

Third, the sample chosen for this study is mostly high-risk, young African-American and White women with riskier sexual behaviors than the general population. So, the results may not be generalizable to women in the general population.

Fourth, the baseline questionnaire that was used to assess the STD behaviors of young women in this study may not be adequate for this population. The questionnaire was initially pilot tested among young college aged women who are significantly different from the clinic and community sample used for this study. So, the reliability and validity of this questionnaire to appropriately assess many factors related to the STD testing behaviors of the study population may be questionable. Yet, since this is an exploratory study, conclusions given may demonstrate other avenues to improve questionnaire reliability and validity for similar clinic and community populations such as the participants in the overall DAISY project.

Fifth, there are two background variables which may not have appropriately assessed what they intended to measure. Age at first intercourse asked at what age the participant had sex for the first time, but whether it was forced or voluntary cannot be determined. A past history of sexual abuse asked respondents about persons who the participant knew or lived with who may have forced them to have sex, but the question did not include persons that the participant may not know or did not live with who might have raped them. This issue is another limitation of conducting a secondary analysis and will limit conclusions about the relationships of these variables in the data.

Sixth, the past STD history measure and number of sexual partner(s) measure are self-reported variables which may be prone to measurement error or underreporting. Self-report data are usually subjected to underreporting of unwanted diseases or infections and even more so for

asymptomatic conditions such as acquisition of Chlamydia and gonorrhea. Young women may not know they were infected and thus may not have sought testing in the past for diagnosis. Additionally, women may not remember the correct number of sexual partners they had in the past year or may underreport because of wanting to give socially acceptable answers.

Seventh, other socio-demographic variables such as income and educational level may not be appropriate for this study. Younger women in this study may not know their household income and may not have answered this question or guessed. This can result in measurement error concerning income. In addition, comparing the educational level of adolescents with young adults may only reveal cognitive or behavioral differences based on age and not necessarily due to lack of education. The lower age groups in this study have not completed high school only because they are not old enough. Thus, more measurement error may occur because of this interpretation.

Eighth, this study is an exploratory study and will not be used to test the utility of the Health Belief Model. So, many of the low reliability coefficient levels (Cronbach's alpha < 0.70) reported from the perception variables created using the factor analysis are preliminary and adequate for such an investigation (perceived susceptibility alpha = 0.674, perceived barriers = 0.702, and perceived benefits = 0.508). For social science research, the most widely accepted cut-off is an alpha of 0.70 or higher. Some researchers may be as lenient as 0.60. Higher values of this reliability coefficient (Cronbach's alpha) indicate questionnaire items that demonstrate a stronger reliability to measure what the researcher intended to measure. While, lower scores of reliability mean that the items may not be the most optimal to use in measuring the intended construct. Thus, perceived benefits created through this factor analysis is the best measure

possible based upon the items provided in the baseline survey, but they may not be the best questionnaire items that should have been created to measure this construct of the HBM.

Lastly, due to the small number of women included in the study sample, there may not be enough power to detect differences among groups and may limit the types of analyses that can be performed on the data (i.e. racial differences, etc.).

4.1.6. Delimitations

Many of the limitations for this study cannot be addressed due to the exploratory nature of this investigation, however, preliminary analyses (i.e. factor analyses, univariate regression analysis – to reduce number of background variables, etc.) aided in overcoming some errors in measurement. Although secondary and cross-sectional data will limit the types of analyses and conclusions made in this study, the results will give some insight into the relationships among these variables. This can also assist the generation of hypotheses for further research in this area.

The use of high-risk groups for this study is warranted because these are individuals who are at highest risk for STD acquisition. So, results may not be generalizable to the general population, but will be helpful regarding participation in STD screening programs for high-risk groups. In addition, data can assist with improving health system factors that encourage participation in STD testing programs and provide a non-threatening test environment.

The inappropriate questionnaire items used to measure age at first intercourse and past history of sexual abuse cannot be addressed because this is a secondary data analysis. This will limit some of the conclusions about the data. Further exploration of this issue can be completed in a follow-up qualitative study that asks more in-depth questions regarding the sexual history of DAISY participants.

Preliminary analyses conducted influenced the variables that will be ultimately used in the final analyses. So, issues concerning income may be addressed because it may be eliminated from the final model due to the large amounts of missing data for this variable. Also, age may be a better predictor of intended outcomes which may assist with understanding how educational level may have an impact on the outcomes of interest in this study.

Lastly, it is acceptable for an exploratory study to use slightly lower thresholds for the perception variables that were developed using factor analyses. The exploratory factor analysis alone allows alike variables to be grouped together and make a more parsimonious set of variables. Thus, the limitation of questionnaire items measuring constructs of the HBM in the baseline assessment was addressed through performing the factor analysis. Low alpha levels for perceived benefits were noted in the discussion of results for this study. The other 3 constructs (perceived susceptibility, severity, and barriers) appear to be adequate for measuring the intended components of the HBM.

In summary, the exploratory nature of this study will offers critical information regarding STD testing behaviors and was not used to test the utility of the model concerning STD testing behaviors. Instead, the focus was to examine the relationships between variables and characterize predictors of the outcome variables.

5. CHAPTER V.

5.1. RESULTS

This chapter presents the results of this exploratory study. Included in this chapter are brief discussions of descriptive statistics, univariate analyses, and multivariate analyses. (Tables of results are displayed in Appendix A).

5.1.1. Total Number of STD Tests Completed

Characteristics of the General Population

Table 5.1-1 provides baseline socio-demographic, psychosocial, and health-related characteristics of the population under study. This study population is made up of 171 DAISY participants who completed the entire two year study at the beginning of this investigation. More than half of the participants in this study self-identified as Black or African American (81%, n = 138) while the remaining participants self-identified as either White (10%, n = 17) or other race (9%, n = 16). Approximately, 75% of all participants were less than 20 years old (n = 129) and 60% had less than high school education (n = 103). The average age of participants was 18.8 years (SD = 2.7). Of all study participants, 47 women (28%) completed high school and 21 women (12%) had greater than high school education. Additionally, more than half of all study participants did not attend church (65%, n = 112).

More than half of the women in this study were recruited from clinic populations (72%, n = 123) and had more then 2 sexual partners within the past year (63%, n = 108). Approximately 41% of participants (n = 70) had symptoms of an STD while about 70% (n=120) were currently taking antibiotics for their most recent Chlamydia or gonorrhea infection. Out of the 120 women reporting antibiotic use, approximately 47% (n = 57) reported that they were having symptoms of an STD at the baseline clinic visit. Eighty-three respondents (36%) reported that they had condom problems in the past 6 months and 95 (56%) said they had a past history of an STD.

Most women did not participate in douching behavior (74%, n = 126) or report a history of sexual abuse (91%, n = 156). However, more than half of study participants did report that their first age of intercourse was between the ages of 12 and 14 (53%, n = 91).

In the area of psychosocial variables, more than half of study participants are depressed (57%, n = 97) and stressed (54%, n = 92). While 54% (n = 92) believe that acquiring an STD is a matter of fate or luck, 45% (n = 77) believe they are in control of whether or not they get an STD and 40% (n = 69) believe that others play a role in whether they get an STD. In addition, most participants had lower social support scores in this study (54%, n = 93).

For substance use, 37% (n = 63) currently smoke cigarettes, 17% (n = 22) used marijuana more than 9 times in the past month, and 50% (n = 86) say they drink alcohol once a month or less.

Background Variables

A preliminary univariate regression analysis was employed to determine which background factors were most associated with the outcome (See Table 5.1-2). This step was undertaken to reduce the amount of variables that would be used in the final analyses to determine the best model which explains the data. The p-value given in this table is based upon the calculation of a partial F statistic in univariate regression analyses between each background variable separately and the outcome. This statistic allowed for the control of the intervention variable (whether the participant was randomized to the home sampling group or clinic group) while conducting the univariate regression analysis. The intervention group variable was included because it was statistically significant to the outcome variable in a univariate analysis (p = 0.075). Additionally, the mean number of STD tests completed is given for each background variable in this table.

Figure 5.1 shows that the total number of STD tests completed by study participants range from 0 to 16 tests during this period. Many of the means for the number of STD tests completed range from approximately 3 to 4 tests during the two-year study period. Higher mean number of STD tests (> 4 tests) were associated with having symptoms of an STD (mean = 5.04), age less than 20 years old (mean = 4.26), less than high school education (mean = 4.26), having a past history of sexual abuse (mean = 4.71), age at first intercourse being greater than or equal to 15 years old (mean = 4.28), having higher stress scores (mean = 4.13), having reported condom problems in the past 6 months (mean = 4.40), believing that others have control over whether one gets an STD (mean = 4.20), cigarette use (mean = 4.02), using marijuana more

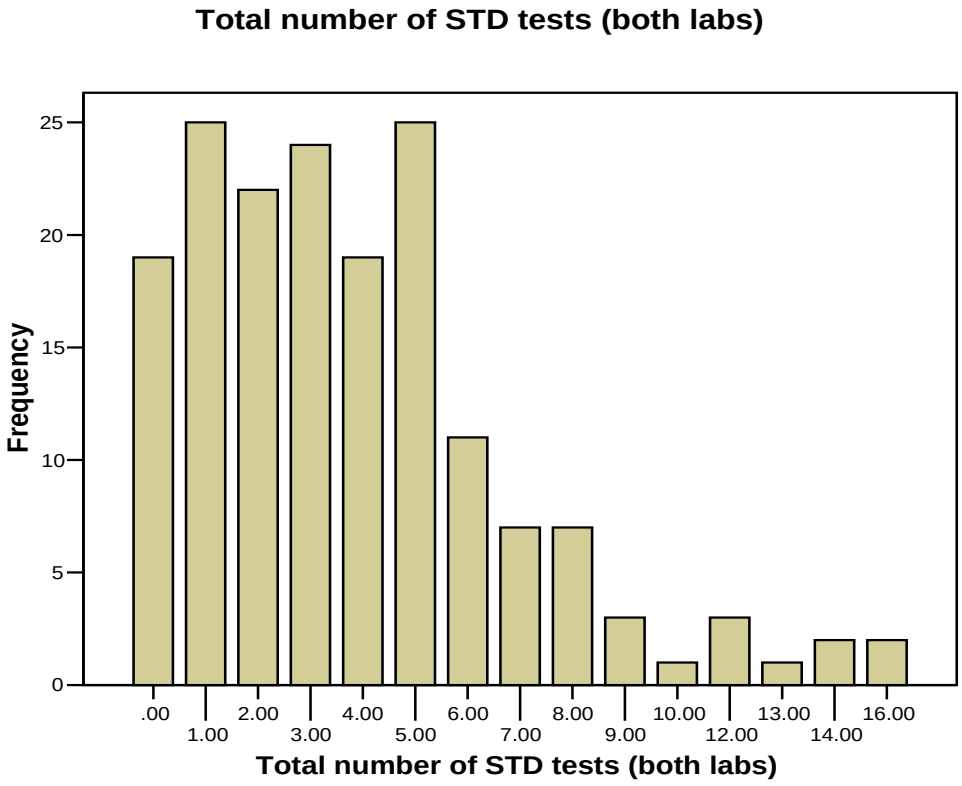

Figure 5-1 Total Number of STD Tests During the 2-yr Study Period

than 3 times in the past month (means 4.42 and 4.51), drinking alcohol 2 to 4 times a month or 2 to 3 times a week (means = 4.27 and 4.75, respectively), and current use of antibiotics (mean = 4.53). There was also a high mean for those who reported no current use of antibiotics in the study (mean = 4.80). The overall mean number of tests for all study participants was 3.85 tests completed over the 2-year study period. Significant background factors ($p < .10$) that will used for the final analyses regarding the number of STD tests completed are age ($p = 0.071$), race ($p = 0.011$), education ($p = 0.048$), symptoms of an STD ($p = 0.0003$), current antibiotic use ($p < 0.0001$), and having condom problems ($p < 0.0001$). Also, the randomized group assignment variable (home sampling intervention vs. reminder for STD testing) was controlled for in the final analyses.

Health Belief Model Perceptions

In Table 5.1-3, the frequency and percent of health belief model perceptions for study participants are presented. High and low categories for the perceptions are based upon the measure's median score (or mean score for perceived benefits). These questionnaire items are based on Likert-type responses that range from 1 to 6 (1 = strongly disagree, 6 = strongly agree). One should note that the perceived benefits of STD testing variable only produced high response values. Most respondents agreed on items concerning the benefits of STD testing. Thus, this item was categorized for high and low based on a mean of 6 (<6 and 6+).

Results for HBM perceptions reveal that 58% perceived high susceptibility of STDs (n = 100) and 74% perceived high benefits of STD testing (n = 126). Responses by study participants were similar for perceived severity to STDs and perceived barriers of STD testing. Fifty-three percent (53%, n = 91) perceived low severity to STDs and low barriers to STD testing. High

perceived severity to STDs and high perceived barriers of STD testing were 47% percent each (n = 80).

In Tables 5.1-4 and 5.1-5, results are presented on background variables and their association with HBM perceptions. These tables show a simple logistic regression analysis that was performed between the dichotomized perception measures (high and low) and all background (predictor) variables used in this study. Odds ratios are presented to show direction of association between background and perception variables. The only inverse relationship that is presented in this table is between background variables and perceived susceptibility because lower value responses to these items demonstrate higher perceived susceptibility to STDs (See Table 5.1-4). So, lower perceived susceptibility to STDs was significant for age at first intercourse, race, and douching behavior. In comparison to Black race, other race has about 5 times more odds for perceiving less susceptibility of STDs (OR = 5.15, p-value = 0.030). For young women who reported their age at first intercourse as greater than age 17, they had approximately 6 more times the odds of perceiving less susceptibility to STDs in relation to those with younger ages at first intercourse (OR = 6.23, p-value = 0.051). Also, perceiving less susceptibility of STDs for young women was significant for women participating in douching behavior (OR = 2.81, p-value = 0.029).

Higher perceived severity to STDs (Table 5.1-4) was significantly associated with attending church (OR = 2.24, p = 0.074), having more social support (OR = 2.18, p = 0.074), and believing less that acquiring an STD is a matter of fate or bad luck (OR = 0.391, p = 0.021).

Higher perceived benefits of STD testing (Table 5.1-5) among study participants was significant for increasing age (OR = 0.649, p = 0.020), having attained education beyond high school (OR = 40.4, p = 0.020), Black race in comparison to White race (OR = 0.150, p-value =

0.027), not being depressed (OR = 0.288, p-value = 0.042), having symptoms (OR = 6.37, p-value = 0.001), not smoking cigarettes (OR = 0.267, p-value = 0.024), having an increasing number of sexual partners in the past year (OR = 0.833, p-value = 0.024), and having condom problems (OR = 2.70, p-value = 0.078). In addition, interesting relationships reveal that young women who drank alcohol monthly or less in comparison to not drinking at all (OR = 2.40, p-value = 0.032) and who had low social support in comparison to high social support (OR = 0.300, p-value = 0.059) perceived higher benefits to STD testing.

Lastly, having higher perceived barriers to STD testing (Table 5.1-5) was significantly associated with age at first intercourse (OR = 6.66, p-value = 0.013 – lower age at first intercourse and OR = 5.65, p-value = 0.056 – older age at first intercourse) and believing that acquiring an STD is determined by other people (OR = 3.77, p-value = 0.002). A variable that came close to being significant was using marijuana in the past month more than 9 times in comparison to not using marijuana at all as a barrier to STD testing (OR = 0.423, p-value = 0.101).

In order to determine what HBM perceptions are associated with the total number of STD tests completed among study participants, a univariate linear regression analysis was employed between HBM perceptions and the outcome variable (See Table 5.1-6). This table shows that the only significant association between completing an increasing number of STD tests completed is having increasingly higher perceptions of severity to STDs (p = 0.097).

Final Analysis

A final stepwise linear regression model to evaluate what factors best explain the total number of STD tests completed by study participants can be seen in Table 5.1-7. This analysis includes all significant background and perception variables from Tables 5.1-2 and 5.1-6. The

intervention (randomized group assignment) variable has been controlled for in this analysis. Thus, the final model demonstrates that having symptoms (p-value = 0.059), current antibiotic use (p-value < 0.000), and having had condom problems (p = 0.044) as the most significant factors for understanding the total number of STD tests completed outcome.

6. CHAPTER VI.

6.1. DISCUSSION

This chapter examines the results of this investigation and discusses plausible explanations for the findings presented in chapter five. Additionally, implications concerning the results will be discussed in relation to practice, theory, policy, and future research initiatives. The discussion will be organized by background factors, health belief model perceptions, and the overall analysis.

6.1.1. Study Overview

Overall, the findings in this study demonstrate that there are a myriad of factors which may impact STD testing behaviors among young women. However, a description of the population researched in this exploratory study is warranted because the results may be simply reflective of the sample chosen for this investigation. The majority of the study population was recruited from clinic settings (approximately 70%) which mean that they are young women who are already receiving STD services and may be somewhat motivated to seek STD testing. The smaller population of young women who were recruited from the community may be less motivated to seek STD care or are not as knowledgeable about where to seek STD testing and/or care. So, most of the population in this study represents a unique segment of the population who are seeking care, but whether they delayed in seeking STD care or other specifics about the STD testing behaviors cannot be determined from this investigation.

This study population also demonstrates that women who are attending STD clinics may be individuals who are at also high risk for STDs as well as other risky outcomes. Many of these women were younger than age 20, had past histories of STD acquisition, were currently taking antibiotics for their most recent Chlamydia or gonorrhea infection, and reported that their first age of intercourse was between the ages of 12 and 14. Most of these factors reveal that there are

multiple risk factors for STD acquisition and that individual characteristics or behaviors are just one aspect of the problem which needs to be addressed in order to control the STD epidemic. Hence, strategies to prevent STDs by researching what significantly impacts STD testing behaviors can offer good insight in addressing prevention efforts among young women.

Therefore, studies such as the research undertaken in this paper significantly add to the literature concerning what factors facilitate or hinder STD testing. In addition, this study investigates whether HBM constructs can be assist in explaining STD testing behaviors. Young women's' perceptions of STD testing and participation in STD-preventive behaviors (i.e. condom use, decreasing number of partners, and getting an STD test every 6 months, etc.) is of utmost importance when attempting to reduce and eliminate the burden of STDs in the US. These factors should be addressed as part of STD prevention programs that are developed by public health or healthcare institutions.

There are also many public health implications for examining predictors of STD testing behaviors because this information can assist with increasing and improving access to quality STD services and potentially improve overall STD screening and testing procedures within numerous health care institutions. Thus, the current research study demonstrates the complexity of STD testing behaviors, and also highlights some background and perception variables that may be necessary to address when developing STD prevention programs for young women at high risk for STDs. Additionally, this information may be helpful in understanding behaviors involved in the Human Immunodeficiency Virus (HIV) epidemic which is also an increasing public health issue among young women.

6.1.2. Background Variables

In general, the study findings revealed that there are numerous background factors that may impact STD testing behaviors. For this study, background factors included a wide range of variables: socio-demographic, psychosocial, and health-related factors. Studies have shown that individual characteristics play a major role in health care seeking behaviors (Amaro & Gornemann, 1991). Factors such as age (Fiscus et al., 2004); socioeconomic status (Crosby et al., 1999; Fortenberry, 1997); educational level (Chacko et al., 2004) have been found to determine where individuals seek treatment, what barriers there are to STD treatment, and reasons for delaying treatment.

In preliminary analyses, the present study found that age, race, education, having symptoms of an STD, current antibiotic use, and having condom problems in the past 6 months were significant factors related to the total number of STD tests completed by participants. These analyses were controlled for the intervention variable which was used to detect any differences between young women who were randomized to the home sampling group versus the STD testing reminder group. In addition, all of the significant factors are also variables where the mean number of STD tests completed for that specific variable was higher than the overall study population mean for STD tests completed -- 3.85 tests. Thus, background factors that were significant to the outcome were associated with an increase in the number of STD tests completed during the two-year study.

A closer look at the intervention variable revealed that women randomized to the home sampling group had a mean number of tests of 4.29 during the study period while the reminder testing group had a mean of 3.42 STD tests during this time period. Since the efficacy of the intervention is not being evaluated in this study, we can not determine if the mean number of

tests were higher for the home testing group due to the intervention. However, it should be noted that there were more tests completed by the home sampling group for the participants in this sample of the DAISY study.

Age in this study may be difficult to characterize because more than half of study participants were younger than age 20. Yet, age was still a significant factor to the outcome which means that there are young women who are getting STD tests and this also means that they are potentially young women who are also being diagnosed with an STD. Research suggests that younger individuals may delay seeking care because they do not perceive themselves at risk of infection (Amaro & Gornemann, 1991), however, they are also more likely to seek STD care at family planning or STD clinics (Brackbill et al., 1999). More than 70% of the women in this study were recruited from STD clinics which may explain why younger individuals may believe that these venues are accessible for STD testing and care. On the other hand, we cannot conclude that these young women actually delayed in seeking care which may be a true for this population also.

Another background factor that was significant to the outcome was race. Race may have played a factor in the outcome for two reasons. One reason was due to the fact that more than 80% of study participants were of African-American race. So, their STD testing behaviors could be more significant than the smaller numbers of White and Other populations in this study. Even though White and Other populations seem to have larger means for the total number of STD tests completed, this may not demonstrate true differences among the races. Second, race in this study may not indicate accurate behaviors because many of the White and Other populations were recruited from the community and the community had to have specific criteria (i.e. greater than 2 sexual partners in the past year) which may be the cause of the differences in number of STD

tests completed. White and Other race individuals in the study had to have reported riskier behaviors than the general population in order to be eligible for the study, and so this population may seek more STD testing than usual. In conclusion, race may be significant to the number of STD tests completed, but the ability to detect differences among the races is hindered due to the small number of White and Other races in this investigation.

Other background factors that were significant to the outcome and may provide insight regarding STD testing behaviors are having symptoms at baseline, current antibiotic use, and having had condom problems in the past six months. Overall, more than 50% of the women in this study reported that they did not have symptoms at baseline. Yet, the women in this study who did report having symptoms had a higher mean number of STD tests completed than women who did not report symptoms. This shows that women may actively seek STD care if they experience symptoms of an infection, but this should not always be the case for STDs because infections such as Chlamydia and gonorrhea are mostly asymptomatic. Evidence reveals that women who indicate that they have symptoms of STDs usually delay seeking care until the symptoms get worse (Aral & Wasserheit, 1998), or even attempt to self-treat themselves before seeking care (Aral & Wasserheit, 1998; Fortenberry, 1997). Once again, we were not able to ascertain the duration of time that it took women to seek care, but this data does show that women may seek STD testing more aggressively because they are experiencing symptoms of an STD.

Much of the literature shows that part of the delay in acquiring STD testing or care has been due to self-treatment of STDs. Individuals who may have had an STD before or who already have antibiotics or other nonprescription medications in their possession may use these drugs to treat their symptoms before they seek medical attention. This is dangerous because

complications due to the infection can worsen if not treated properly and possibly give the young woman a false sense of perceiving that she is cured from the disease. Other thoughts that should be noted concerning women who are currently taking antibiotics and seeking STD testing, may be that seeking additional tests is linked to non-compliance with treatment regimens for previous STD diagnoses. In addition, young women may be re-infected with Chlamydia or gonorrhea which prompts their return for STD testing. High STD re-infection rates have been suggested in the literature to be important in changing current STD screening recommendations (Burstein et al., 1998), but this also shows that young women are not modifying their high-risk sexual behaviors to account for current STD infections.

The issue of having condom problems as a catalyst for seeking STD testing is an interesting finding in this study. This basically demonstrates that those women who reported condom problems in the past six months were more likely to seek STD testing. Although this appears to be a positive result for seeking STD care, it also reveals that improper condom use is still a factor among individuals. This is another important issue to address when developing STD prevention programs because the literature does show that there are high rates of inconsistent condom use and that proper use of condoms is also a risk for acquiring an STD.

Variables which were associated with a higher mean number of STD tests completed, but were not significant to the outcome are past history of an STD, age of first intercourse greater or equal to age 15, past history of sexual abuse, believing that others play a role in whether the participant gets an STD, stress, cigarette smoking, marijuana use, and alcohol use. These variables may be important issues to address when seeking to understand what factors impact healthcare seeking behaviors or perceptions of STD testing or care. Women who appear to engage in riskier behaviors may access services more often which increase their chances for

obtaining an STD test, but it also interesting that having a past history of an STD, stress, and sexual abuse also led to a slight increase in the number of STD tests completed. Young women with past STD history should already know what to do to prevent further infections, but this study supports previous literature showing that women rarely change behaviors to prevent STDs after being diagnosed with an STD (Fortenberry, 1997; T. Kershaw et al., 2004). Additionally, background factors such as stress and sexual abuse would appear to be a barrier to seeking STD testing for women. However, being stressed or having a history of sexual abuse for this population was not a barrier, but a possible force which prompted women to seek STD testing. Yet, caution must be used in interpreting these data because there were only a few number of participants who reported being sexually abused (n = 14, 8%).

Background factors which have been found in previous literature to influence STD seeking behavior, but were not significant to the total number of STD tests completed alone in this study are depression and social support. Depression has been shown to be a barrier to seeking care among diverse populations (Amaro & Gornemann, 1991) while social support from friends and sex partners concerning STDs positively influenced seeking STD healthcare (Fortenberry & Zimet, 1999). However, these conclusions were not apparent in this study.

In conclusion, there are many background factors which show higher number of STD tests completed in this study, but only age, race, education, having symptoms of an STD, having had condom problems in the past six months, and current antibiotic use were significant to the total number of STD tests completed by study participants. Some of the background factors such as age, race, and education are mostly likely significant due to the nature of the population under study. Many participants were of African-American race and young so this does not demonstrate true differences among groups. However, this does reveal that there are many young African-

American women in Pittsburgh, PA who are accessing STD services and being infected by Chlamydia and gonorrhea at alarming rates. Other significant factors such as current antibiotic use and having had condom problems in the past 6 months show that there are many issues that need to be addressed in improving the self-efficacy of adherence to treatment regimens and condom use. Additionally, having symptoms serves as a catalyst for acquiring an STD test in this study is not necessarily a positive result because most Chlamydia and gonorrhea infections are asymptomatic. These results reveal that there are many challenges in understanding testing behaviors of young women, but it is obvious that specific individual characteristics (being young, past history of an STD, etc.) and STD prevention program characteristics (i.e. education concerning proper medication use, proper condom application, and adherence to prophylactic regimens, etc.) need to be addressed to positively influence STD testing among similar populations. In addition, background factors such as church attendance, number of sexual partners, depression, stress, sexual abuse, alcohol and marijuana use, and douching behavior should be further researched to understand their impact on willingness to seek STD care.

6.1.3. Health Belief Model Perceptions

Overall, the majority of participants in this study perceived high susceptibility to STDs, low severity to STDs, high benefits of STD testing, and low barriers to STD testing. This study is unique because it uses all components of the HBM to characterize a STD testing behavior. Currently, there is very limited literature regarding how the components of the Health Belief Model influence STD testing behaviors and whether the HBM is suitable for explaining STD testing behaviors.

Association with Background Factors

In this study population, having a lower perceived susceptibility to STDs was

significantly associated with younger age at first intercourse, other race, and participating in douching behavior. So, young women in this study who were older at first intercourse, were of African-American race, and participated in douching behavior had higher perceived susceptibility to STDs. Previously, perceived susceptibility was found to be a stronger predictor of preventive health behavior (Janz & Becker, 1984; Rosenstock et al., 1994). Evidence also reveals that many younger individuals misperceive their risk of STDs (Ford, Jaccard, Millstein, Viadro et al., 2004), however, perceived risk of infection has been associated with being Black, having a diagnosis of an STD, and reporting current symptoms (Ford, Jaccard, Millstein, Bardsley et al., 2004). Therefore, young women who appear to be older when they first have sex or are douching in possible attempts to self-treat symptoms of an STD are more likely to have higher perceptions of susceptibility to STDs. It may also be true that having higher perceptions of susceptibility to STDs can be influenced by experiences of already having had an STD and becoming more knowledgeable about the symptoms associated with Chlamydia and gonorrhea infections.

Higher perceptions of severity to STDs were significantly associated with church attendance, higher levels of social support, and believing less that STDs are due to chance. These individual factors may be positive influences which give knowledge to young women regarding the consequences of sexual behaviors such as getting an STD or becoming pregnant. This is because the severity question deals with the inability of women to get pregnant if they get a Chlamydia or gonorrhea infection. In addition, young women who believe that STDs are not due to chance or bad luck may understand the severity of these infections better more efficiently than women who believe that STDs are a matter of luck. Overall, perceived severity to STDs has not been sufficiently studied regarding STD testing or acquisition. In one study, a

combination of perceived susceptibility and severity were examined to understand adolescents' worry about becoming infected with an STD. Most adolescents in this study were not worried about STDs, but those who had higher perceptions of susceptibility and severity had histories of an STD, low partner communication and unable to negotiate condom use (Crosby, DiClemente, Wingood, Sionean, Harrington, Davies et al., 2001). Another study found that perceiving severity of STDs did not significantly impact condom use (Zak-Place & Stern, 2004). Thus, correctly perceiving the severity of STDs can be representative of positive influences in an individual's life and the control they believe they have in their behaviors which can ultimately affect their STD-preventive behaviors. It should also be noted that there were larger number of young women in this study who may not relate to the inability to get pregnant because they may not even view pregnancy at their age as a viable outcome.

Young women in this study who had higher perception of benefits of STD testing were significantly associated with increasing age, having obtained higher education, race, not being depressed, having symptoms of an STD, having condom problems, and an increasing number of sexual partners. Higher perceptions were even associated with non-cigarette and cigarette use, having low social support, and drinking alcohol less. One reason why perceptions of benefits include many background factors is because the majority of women in this study reported that they perceived many benefits to STD testing. In addition, this variable had a lower reliability coefficient than the other perception items so this may be a problem variable and not effectively measure perceived benefits of STD testing. Overall, literature has shown that perceived benefits is a better predictor of sick-role behavior than preventive health behaviors (Janz & Becker, 1984; Rosenstock et al., 1994). In addition, perceiving more benefits of HIV testing was associated with individuals who were more likely to seek testing (Dorr et al., 1999). As a result, the only

conclusion that one can draw from these results is that many women do perceive that there are benefits to STD testing, but determining whether they sought STD testing for these perceptions cannot be determined in this study.

The last perception variable assessed in this study for the HBM was perceived barriers to STD testing. This construct was significantly associated with age at first intercourse and the belief that others play a role in whether one gets an STD. The use of marijuana more than 9 times in the past month was also close to being a significant factor to perceiving barriers to STD testing ($p = 0.101$). It is evident that barriers to STD testing affect women who had a first sexual experience at younger and older ages. This study also revealed that young women who believe they have less control over whether they get an STD because others play a role in whether they get an STD may give insight to women who feel powerless in the decision to protect themselves against STDs.

Much of the literature regarding barriers to STD testing have focused on issues including: fear of gynecological exams (Burack & Meyer, 1997); stigma (Fortenberry et al., 2002; Lichenstein, 2003); and, STD testing issues such as confidentiality (Amaro & Gornemann, 1991) and provider and clinic characteristics (Barth et al., 2002; Dienes et al., 2004; Tilson et al., 2004). So, perceiving barriers to STD testing is not an unusual phenomenon, especially for young and older ages alike. Women do not like being stigmatized for seeking an STD test, they fear pelvic exams, they may be apprehensive to seek care if participating in illegal activities, they may feel their confidentiality is not maintained, or they may feel that their powerlessness in relationships keeps them from seeking an STD test. Therefore, STD testing programs need to address issues related to barriers to care such as improving provider training regarding STD care, making STD testing and clinic environments more confidential, and finding less invasive

techniques to perform an STD test. Also, programs should encourage those using marijuana or participating in other risky behaviors to seek STD testing for improving their overall health.

Association with Outcome Variable

The HBM perception variables were placed in a univariate analyses with the total number of STD tests completed outcome. Each variable was fitted separately in a model that controlled for the intervention variable and assessed its association with the outcome of interest. The only perception variable that was significant to an increasing number of STD tests completed was perceived severity ($p = 0.097$). This means that higher perceptions of severity to STDs among young women were related to completing an increasing number of STD tests during the study period. This conclusion is surprising because out of all the HBM constructs, perceived severity has been found to be the least powerful predictor of preventive health behavior among previously published studies (Janz & Becker, 1984; Rosenstock et al., 1994). In addition, Zak-Place and Stern (2004) reported that severity of STDs was not significant to intended STD testing among college students (82% White, 6% Black). Hence, perceived severity may not traditionally be associated with preventive health behavior, but this study revealed that knowing consequences of STDs can influence young women to seek STD testing at slightly significant higher rates.

6.1.4. Final Model for Understanding the Total Number of STD Tests

The final model in this study included all significant background factors (age, education, race, having symptoms, current antibiotic use, and having condom problems) and significant perception variable, perceived severity. In this final model, a multivariate stepwise linear regression model was employed which resulted in three statistically significant factors ($p \leq 0.10$). These factors were having symptoms of an STD at baseline, having had condom problems in the past six months, and current antibiotic use. The perceived severity variable did not remain

significant with all the background variables in the model. Likewise, age, education, and race were removed from the model because of the addition of perceived severity. This may demonstrate that perceptions of severity were more likely to be related to age, education, and race in this study. Additionally, these results show that HBM constructs or the questions used to measure these components were not sufficient enough to characterize STD testing behaviors among young women in this population.

6.2. CONCLUSION

The modified schematic design of the HBM was used in this study to guide the research which explored STD testing behaviors among young women at risk for STDs in Pittsburgh, PA. The model shows that background variables alone, perception variables alone, and/or background and perception variables together can potentially influence the behavior of interest, number of STD tests completed during a two-year study. The results of this investigation found that none of the Health Belief Models perceptions, except perceived severity, were associated with obtaining an STD testing during the study period. Further analyses demonstrated that when perceived severity was added to other significant background factors, it was no longer significant to the outcome. Thus, the only significant factors to the number of STD tests completed outcome was having symptoms at baseline, having had condom problems in the past six months, and current antibiotic use.

Theoretical Conclusions

The results of this exploratory study does not suggest that the Health Belief Model is not useful for understanding STD testing behaviors, but that the specific questions utilized may not be sufficient for assessing this type of outcome. The analyses provided that assessed the relationship between background factors and perceptions appear to give more conclusive results

concerning how young women perceived STDs and STD testing. Thus, the Health Belief Model does show that perceptions can be influenced by various background factors and may be essential in developing programs that aim to modify perceptions of STDs and STD testing in diverse individuals.

It is also not clear whether STD testing should be labeled a preventive health behavior or a sick-role behavior in this study. Since much of the previous empirical evidence that supports the HBM discusses its influence in this manner, there needs to be more information to determine if STD testing should be identified as a preventive health technique and not as sick role behavior. However, results from this study reveal that most young women used recognition of symptoms and/or current antibiotic use as a potential catalyst for obtaining an STD test while a preventive health behavior may be suggested as the motivating factor for participants who mentioned they had condoms problems in the past six months. An exploration of all HBM components, instead of specific perceptions which have been used in most reviewed articles, should be utilized in future research to understand STD testing behavior.

In conclusion, the results of this study demonstrate that the manner in which the HBM was used in this study was not adequate in explaining the number of STD tests completed. However, the HBM could be useful for assessing STD testing behaviors if more research was performed to determine adequate questions that could be used to measure HBM components associated with STD testing and if STD testing is researched as a preventive health behavior versus a sick-role behavior. Moreover, the HBM provided interesting results regarding how background factors impact perception variables in this study. Hence, theoretical considerations for understanding STD testing behaviors would be to enhance the development of questions for

perception variables that adequately measure diverse aspects of how a myriad of factors affect perceptions and then ultimately behaviors.

Practical Implications

The background factors that were found in the final model to be significant to an increasing number of STD tests completed provide helpful suggestions for STD testing services and/or STD prevention programs. These practical suggestions would address symptom recognition, having condom problems, and using antibiotics effectively as part of program components. In addition, programs should encourage perceptions among individuals that prompt routine STD testing for those who are sexually active is important. Furthermore, it should be noted that this study identified several, diverse background factors concerning study participants which can be further explored as risk factors for STD testing behaviors. Background factors such as age, race, education, church attendance, having had condom problems in the past 6 months, age at first intercourse, health locus of control, and marijuana use may be important for understanding STD testing behaviors. Issues related to income or SES influences were not used in this study due to lack of data, but many women reported that they had some type of insurance (i.e. government health insurance, etc.) and did not have problems accessing care (i.e. no large wait times, very little out of pocket expenses for care or medications, etc.).

In addition, it was mentioned earlier that many of the women who reported symptoms at baseline were not necessarily women who were currently using antibiotics which means that recognizing symptoms and possible re-infection of STDs or self-treatment are critical issues to address for STD prevention purposes. These issues may be difficult to address because many STDs are asymptomatic in women, but educating younger individuals about consequences of

STDs, risks associated with Chlamydia and gonorrhea and proper methods to care for their health (i.e. obtain STD testing every 3 to 6 months if sexually active) will be essential to controlling the STD epidemic.

On the other hand, there needs to be modifications in the way healthcare professionals are trained to assess young women and men regarding sexual health issues. Evidence shows that provider characteristics are critical in understanding the consequences of STDs and engaging in behaviors that prevent complications due to STDs (i.e. condom use, adherence to medication regimens, routine STD testing, etc.). This is a major reason why STD testing behaviors were used in this exploratory research instead of STD screening behaviors. The use of STD testing behaviors implied that young women had to be motivated in some way to seek STD testing while STD screening behaviors can be a combination of a recommendation from a provider and patient decision-making. Thus, STD testing was chosen because the goals of this study were to understand how individuals perceive STDs and STD testing and if this affects how young women seek STD tests.

Additionally, some of the barriers to STD testing could be addressed in newer STD prevention programs that aim to increase STD testing among individuals at high risk for STDs. Some options are to: 1) develop less invasive techniques such as vaginal swab sampling or urine tests; 2) discover what settings are most effective for specific populations to access services; 3) train providers to be more comfortable and able to encourage STD testing (i.e. improve clinic environments, gynecological rotations, etc.; and 4) find other aspects of everyday life that provide a foundation for making healthier sexual decisions (i.e. church attendance, positive social support, etc.).

In conclusion, practical implications for STD testing services and STD prevention programs can address background and perception issues that were discussed in this study. Factors related to health were more likely to explain STD testing behaviors. Other background factors and perceptions were not significant to the outcome. However, results on what influenced perception variables and other background factors demonstrate that STD prevention programs and providers need to focus educational information given to these women on the asymptomatic nature of STDs, consequences of untreated STDs, correct condom usage, and proper adherence to treatment regimens.

Policy Recommendations

Based upon the final results of this study, it is obvious that there needs to be screening and policy recommendations which encourage young women and providers to actively engage in STD testing behaviors. It appears that sexually active individuals may need to seek STD testing more frequently than 6 months due to the high rates of re-infection in certain populations. This study also reveals that women who are seeking testing have symptoms at baseline or are already taking antibiotics for a recent infection. This means that more aggressive prevention techniques such as discussing prevention techniques at the clinic visit (i.e. proper use of condoms, medication adherence, complications of untreated STDs, etc.) should be part of STD testing or screening protocol. In addition to this being a policy recommendation, there should be health quality measures which monitor certain details surrounding STD testing experiences.

Policies should also encourage providers to assess all females and males who are sexually active for their sexual health practices (no matter what the age). This could be an opportunity for providers to initiate open discussion with individuals regarding their behaviors and what services

are available that can better address some specific issues they make have regarding this phenomenon.

In addition, STD prevention messages in the mass media must be of utmost importance in the US. Instead of just HIV, there needs to be mass awareness of what could be the consequences of unprotected sexual behaviors or how risky sexual practices could make persons at high risk for specific STDs. These messages do not have to discuss sex directly, but highlight ranges of ages and races in discussing how STDs are a public health problem for our nation.

Future Research Initiatives

In summary, although the results of this exploratory study provide a broad array of concepts that may be associated with STD testing behaviors among high-risk young women, there are only a few background factors that were found to significant to the outcome of interest. Further research on how behavioral, socio-demographic, clinical, and cognitive factors impact STD testing behaviors are essential to controlling the STD epidemic. Issues that have been discussed surrounding theoretical, practical, and political conclusions for this paper aim to give attention to an area of STD literature that has been given little focus. It is centrally important to understand utilization of STD services so that they can be improved and ultimately reduce and eliminate the STD epidemic in the US. Therefore, studies such as the one provided can demonstrate the research needs for young women concerning STDs and assist with determining innovative methods to encourage STD testing among individuals at high-risk for Chlamydia and gonorrhea.

APPENDIX A

Result Tables

Table 5.1- 1 Baseline Socio-demographic, Psychosocial, and Health-Related Characteristics of Study Participants (Frequency and Percentage)

	Total Number of STD Tests Completed N = 171	
Variable	**n**	**%**
Age		
< 20	129	75
≥ 20	42	25
Race		
Black	138	81
White	17	10
Other	16	9
Education		
< High School	103	60
High School Grad	47	28
> High School	21	12
Attend Church		
Yes	59	35
No	112	65
# Partners in Past Year		
< 2	63	37
≥ 2	108	63
Recruitment Group		
Clinic	123	72
Community	48	28
Randomized Group Assignment		
Home sampling	85	50
Clinic testing	86	50
Symptoms of STD*		
(n = 169) Yes	70	41
No	99	58

Table 5.1 – 1 Continued – Baseline Characteristics

Currently Taking Antibiotics* (n = 130)		
Yes	120	70
No	10	6
Had Condom Problems* (n = 145)		
Yes	83	36
No	62	29
Past History of an STD		
Yes	95	56
No	76	44
Douches		
Yes	44	26
No	126	74
Age at First Intercourse		
12-14	91	53
15+	80	47
Past History of Sexual Abuse* (n = 170)		
Yes	14	8
No	156	91
Stress		
Yes	92	54
No	79	46

Table 5.1 -1 Continued – Baseline Characteristics

Depression		
Below Median	74	43
Above Median	97	57
Health Locus of Control		
Internal		
Below Median	94	55
Above Median	77	45
Chance		
Below Median	77	46
Above Median	92	54
Powerful Others		
Below Median	102	60
Above Median	69	40
Social Support		
Below Median	92	54
Above Median	78	46
Cigarette Use		
Yes	63	37
No	108	63
Marijuana Use in Past Month** (n = 128)		
None	61	48
1 – 2 times	26	20
3 – 8 times	19	15
> 9 times	22	17

* Numbers do not add up to total population because there was some missing data

** Numbers do not add up to the total population because this was the only number of respondents who reported participating in this behavior

Table 5.1- 2 Mean Number of STD Tests Completed and their Association with Baseline Socio-demographic, Psychosocial, and Health-Related Characteristics of Study Participants

Variable	Mean Number of STD Tests Completed Mean (SD)	P-value
Age		
< 20	4.26 (3.3)	**0.071**
≥ 20	2.62 (2.4)	
Race		
Black	3.61 (3.1)	**0.011**
White	4.00 (3.2)	
Other	5.75 (4.1)	
Education		
< High School	4.26 (3.3)	**0.048**
High School Grad	3.40 (2.8)	
> High School	2.85 (3.4)	
Randomized Group Assignment		
Home sampling	4.29 (3.3)	**0.075**
Clinic testing	3.42 (3.0)	
Attend Church		
Yes	3.95 (3.0)	0.862
No	3.80 (3.3)	
# Partners in Past Year		
< 2	3.87 (3.0)	0.531
≥ 2	3.84 (3.4)	
Symptoms of STD*		
Yes	5.04 (3.9)	**0.0003**
No	3.03 (2.4)	

Table 5.1 -2 Continued – Mean Number of STD Tests Completed

Currently Taking Antibiotics*		
Yes	4.53 (3.4)	**<0.0001**
No	4.80 (2.2)	
Had Condom Problems*		
Yes	4.40 (3.4)	**<0.0001**
No	3.37 (2.9)	
Past History of an STD		
Yes	4.05 (3.3)	0.423
No	3.69 (3.2)	
Douches		
Yes	3.93 (3.2)	0.836
No	3.84 (3.2)	
Age at First Intercourse		
12-14	3.41 (2.8)	0.240
15+	4.28 (3.8)	
Past History of Sexual Abuse*		
Yes	4.71 (2.8)	0.362
No	3.79 (3.8)	
Stress		
Below Median	3.62 (3.4)	0.522
Above Median	4.13 (3.0)	
Depression		
Yes	3.76 (3.1)	0.528
No	3.97 (3.3)	

Table 5.1 – 2 Continued – Mean Number of STD Tests Completed

Health Locus of Control		
Internal		
Below Median	3.78 (3.1)	0.751
Above Median	3.95 (3.3)	
Chance		
Below Median	3.73 (3.3)	0.721
Above Median	3.96 (3.1)	
Powerful Others		
Below Median	3.62 (3.1)	0.219
Above Median	4.20 (3.3)	
Social Support		
Below Median	3.92 (3.4)	0.907
Above Median	3.77 (2.9)	
Cigarette Use		
Yes	4.02 (3.8)	0.604
No	3.76 (2.8)	
Marijuana Use in Past Month (n = 128)		
Has never used	3.88 (2.8)	0.191
None	3.39 (2.6)	
1 – 2 times	3.22 (2.3)	
3 – 8 times	4.42 (4.2)	
> 9 times	4.51 (4.8)	
Drinks Alcohol		
Not at all	3.88 (3.2)	0.668
Monthly or less	3.60 (2.7)	
2 to 4 times/ month	4.27 (3.9)	
2 to 3 times/ week	4.75 (4.9)	
4 + times/ week	3.50 (2.1)	

Note. Significant p-values from univariate regression analyses between the specified background variable and outcome are in bold.

All models presented were controlled for the intervention group variable.

* Numbers to do not add up to total population because there was some missing data

Table 5.1- 3 Health Belief Model Perceptions (HBM)
(Frequency, Percentage, and Median Scores)

Health Belief Model Perceptions	n	%	Median Score (Range)
Perceived Susceptibility of STDs			
Low	71	42	3.00 (1.0 – 6.0)
High	100	58	
Perceived Severity to STDs			
Low	91	53	4.00 (1.0 – 6.0)
High	80	47	
Perceived Benefits of STD Testing*			
Low	45	26	5.82 (3.5 – 6)
High	126	74	(Mean = 6)
Perceived Barriers of STD Testing			
Low	91	53	3.09 (1.45 – 5.27)
High	80	47	

*Low/High category based on Mean score due to higher values for scores; all other categories based on median score
Based on number of participants who completed the study at this point (N=171)

Table 5.1- 4 Background Variables and HBM Perceptions (Susceptibility & Severity) (Univariate Logistic Regression)

	Perceived Susceptibility to STDs			***Perceived Severity to STDs***		
Variable	**OR**	**p-value**	**(CI)**	**OR**	**p-value**	**(CI)**
Age						
(continuous)	1.05	0.728	(0.796, 1.38)	1.02	0.863	(0.793, 1.32)
Education						
<HS (1)	(Baseline category)					
HS Grad (2)	0.679	0.590	(0.166, 2.77)	0.727	0.630	(0.199, 2.66)
>HS (3)	0.533	0.538	(0.72, 3.95)	0.436	0.392	(0.065, 2.91)
Attend Church						
No (0) Yes (1)	1.71	0.248	(0.688, 4.24)	2.24	**0.074****	(0.925, 5.44)
Age at First Intercourse						
<=12 (1)	(Baseline category)					
13-14 (2)	2.21	0.272	(0.536, 9.14)	0.841	0.794	(0.229, 3.08)
15-16 (3)	1.10	0.895	(0.236, 4.8)	0.846	0.808	(0.220, 3.26)
>=17 (4)	6.23	**0.051***	(0.988, 39.3)	1.55	0.601	(0.297, 8.14)
Race						
Black (1)	(Baseline category)					
White (2)	1.13	0.859	(0.281, 4.58)	0.762	0.696	(0.194, 2.98)
Other (3)	5.16	**0.030***	(1.17, 22.7)	1.46	0.580	(0.382, 5.58)
Stress						
Below Median (1) Above Median (2)	1.26	0.628	(0.504, 3.11)	0.528	0.147	(0.223, 1.25)

Table 5.1 -4 Continued - Background Variables and HBM Perceptions (Susceptibility & Severity)

Social Support						
Below Median (1)	(Baseline category)					
Above Median (2)	1.96	0.160	(0.767, 4.98)	2.18	**0.074****	(0.927, 5.15)
Health Locus of Control – Internal						
Below Median (1)	(Baseline category)					
Above Median (2)	1.67	0.227	(0.727, 3.83)	0.795	0.553	(0.372, 1.70)
Health Locus of Control – Chance						
Below Median (1)	(Baseline category)					
Above Median (2)	0.588	0.214	(0.255, 1.36)	0.391	**0.021***	(0.176, 0.870)
Health Locus of Control – Powerful Others						
Below Median (1)	(Baseline category)					
Above Median (2)	0.875	0.758	(0.374, 2.05)	1.34	0.466	(0.612, 2.92)
Past STD						
No (0)	1.31	0.554	(0.531, 3.25)	1.48	0.363	(0.633, 3.48)
Yes (1)						
Having symptoms						
No (0)	1.64	0.246	(0.709, 3.82)	1.52	0.273	(0.718, 3.22)
Yes (1)						
Currently taking Antibiotics						
No (0)	0.866	0.447	(0.598, 1.25)	0.833	0.291	(0.593, 1.17)
Yes (1)						

Table 5.1 – 4 Continued - Background Variables and HBM Perceptions (Susceptibility & Severity)

Past History of Sexual Abuse						
No (0)						
Yes (1)	2.18	0.322	(0.465, 10.2)	0.520	0.406	(0.111, 2.43)
Participates in Douching Behavior						
No (0)	2.81	**0.029***	(1.11, 7.12)	1.05	0.909	(0.440, 2.52)
Yes (1)						
Had Condom Problems						
No (0)	0.997	0.995	(0.420, 2.37)	1.16	0.728	(0.504, 2.66)
Yes (1)						
Marijuana Use in Past Month						
None	(Baseline category)					
1 – 2 times	2.09	0.126	(0.404, 3.48)	0.758	0.557	(0.300, 1.91)
3 – 8 times	1.29	0.635	(0.204, 1.28)	1.15	0.793	(0.409, 3.22)
> 9 times	1.48	0.439	(0.316, 2.84)	0.715	0.506	(0.266, 1.92)
Ever Smoked Cigarettes						
No (0)	1.66	0.255	(0.692, 3.99)	1.79	0.169	(0.780, 4.12)
Yes (1)						
Drinks Alcohol						
Not at all	(Baseline category)					
Monthly or less	0.623	0.212	(0.296, 1.32)	1.70	0.166	(0.801, 3.61)
2 to 4 times/ month	0.571	0.239	(0.225, 1.45)	1.95	0.157	(0.772, 4.92)
2 to 3 times/ week	0.600	0.519	(0.127, 2.84)	0.542	0.484	(0.097, 3.02)
4 + times/ week	dropped			dropped		
# partners in past year (continuous)	0.97	0.995	(0.420, 2.37)	0.909	0.728	(0.504, 2.66)

Note. Baseline category identifies how one would compare the significance of the remaining categories for that specific variable.
*Significant at $p < 0.05$

Table 5.1- 5 Background Variables and HBM Perceptions (Benefits & Barriers) (Univariate Logistic Regression)

	Perceived Benefits of STD Testing			*Perceived Barriers to STD Testing*		
Variable	**OR**	**p-value**	**(CI)**	**OR**	**p-value**	**(CI)**
Age						
(continuous)	0.649	**0.020***	(0.451, 0.934)	1.25	0.118	(0.945, 1.65)
Education						
<HS	(Baseline category)					
HS Grad	1.83	0.472	(0.353, 9.49)	0.505	0.327	(0.129, 1.98)
>HS	40.4	**0.020***	(1.78, 917.7)	0.281	0.200	(0.040, 1.96)
Attend Church						
No (0)	2.65	0.107	(0.809, 8.68)	1.70	0.257	(0.677, 4.29)
Yes (1)						
Age at First Intercourse						
<=12	(Baseline category)					
13-14	2.88	0.217	(0.536, 15.5)	6.66	**0.013***	(1.49, 29.7)
15-16	4.46	0.111	(0.708, 28.1)	2.46	0.250	(0.532, 11.4)
>=17	6.61	0.114	(0.636, 68.7)	5.65	**0.056****	(0.954, 33.4)
Race						
Black	(Baseline category)					
White	0.150	**0.027***	(0.28, 0.808)	0.380	0.177	(0.093, 1.55)
Other	1.28	0.780	(0.227, 7.23)	1.82	0.384	(0.472, 7.02)
Stress						
Below Median	(Baseline category)					
Above Median	2.09	0.208	(0.663, 6.58)	0.696	0.427	(0.284, 1.70)
Depression						
No	0.288	**0.042***	(0.086, 0.953)	1.60	0.330	(0.623, 4.08)
Yes						

Table 5.1 – 5 Continued - Background Variables and HBM Perceptions (Benefits & Barriers)

Social Support						
Below Median	(Baseline category)					
Above Median	0.300	**0.059****	(0.0863, 1.05)	1.25	0.622	(0.514, 3.04)
Health Locus of Control – Internal						
Below Median	(Baseline category)					
Above Median	1.63	0.331	(0.609, 4.34)	0.613	0.237	(0.272, 1.38)
Health Locus of Control – Chance						
Below Median	(Baseline category)			0.771	0.534	(0.340, 1.75)
Above Median	0.627	0.371	(0.226, 1.74)			
Health Locus of Control – Powerful Others						
Below Median	(Baseline category)			3.77	**0.002***	(1.59, 8.90)
Above Median	1.64	0.367	(0.560, 4.80)			
Past STD						
No						
Yes	0.795	0.707	(0.240, 2.62)	1.29	0.563	(0.540, 3.10)
Having symptoms						
No	6.37	**0.001****	(2.07, 19.6)	0.702	0.385	(0.316, 1.56)
Yes						
Currently taking Antibiotics						
No	0.686	0.123	(0.425, 1.11)	0.913	0.611	(0.645, 1.29)
Yes						

Table 5.1 – 5 Continued - Background Variables and HBM Perceptions (Benefits & Barriers)

Past History of Sexual Abuse						
No	2.30	0.507	(0.196, 27.1)	1.59	0.567	(0.322, 7.89)
Yes						
Participates in Douching Behavior						
No	2.11	0.239	(0.608, 7.31)	0.758	0.547	(0.307, 1.87)
Yes						
Had Condom Problems						
No	2.70	**0.078****	(0.893, 8.18)	1.62	0.275	(0.679, 3.88)
Yes						
Marijuana Use in Past Month						
None	(Baseline category)					
1 – 2 times	1.19	0.757	(0.404, 3.48)	0.777	0.591	(0.309, 1.95)
3 – 8 times	0.610	0.375	(0.204, 1.82)	1.25	0.678	(0.440, 3.52)
> 9 times	0.948	0.924	(0.316, 2.84)	0.423	0.101	(0.151, 1.18)
Ever Smoked Cigarettes						
No	0.267	**0.024***	(0.085, 0.841)	0.945	0.899	(0.391, 2.28)
Yes						
Drinks Alcohol						
Not at all	(Baseline category)					
Monthly or less	2.40	**0.032***	(1.08, 5.33)	1.16	0.702	(0.551, 2.42)
2 to 4 times/ month	2.12	0.142	(0.77, 5.81)	1.14	0.780	(0.457, 2.84)
2 to 3 times/ week	4.76	0.161	(0.536, 42.3)	0.404	0.299	(0.073, 2.23)
4 + times/ week	dropped			1.21	0.895	(0.071, 20.7)
# partners in past year (continuous)	0.833	**0.024***	(0.711, 0.976)	0.958	0.410	(0.865, 1.06)

Note. Baseline category identifies how one would compare the significance of the remaining categories for that specific variable.
*Significant at $p < 0.05$ ** Significant at $p < 0.10$

Table 5.1- 6 HBM Perceptions and their Association with Total Number of STD Tests Completed (Univariate Linear Regression)

	Increasing Number of STD Tests Completed N = 171		
Health Belief Model Perceptions	**Regression Coefficient (CI)**	**Calculated F Statistic**	**p-value**
Perceived Susceptibility	0.226 (-0.101, 0.554)	1.86	0.174
Perceived Severity	0.240 (-0.044, 0.525)	2.78	**0.097**
Perceived Benefits	-0.806 (-2.02, 0.404)	1.73	0.190
Perceived Barriers	0.132 (-0.456, 0.722)	0.198	0.657

Note. Univariate regression analyses include fitting a model with the one specified perception variable and the outcome.

p-value is derived from calculating a partial F statistic that controls for the intervention group as part of the regression analysis (significant p-values in bold)

CI = Confidence Interval

Table 5.1- 7 Final Model with Significant Background Variables and Perceived Severity and their Association with Total Number of STD Tests Completed (Stepwise Multivariate Linear Regression Analysis)

Variables	Regression Coefficient	p-value	CI
Age (continuous)	(removed)	0.629	
Education			
<HS	(removed)	**.**	
HS Grad		0.449	
> HS		0.382	
Race			
Black	(removed)	**.**	
White		0.863	
Other		0.168	
Symptoms	0.922	**0.059**	(-0.036, 1.88)
Currently Taking Antibiotics	0.769	**<0.000**	(0.352, 1.18)
Had Condom Problems	0.958	**0.057**	(-0.030, 1.95)
Perceived Severity	(removed)	0.267	

Note. Significant background variables are from the analyses in Table 5.1-2.

Perceived severity is the only perception variable that was significant in preliminary analysis and included in this final model.

CI = Confidence Interval

Nonsignificant factors in the final model were removed during the stepwise regression analysis.

This final multivariate model has been controlled for the intervention variable.

Overall significant variables in this multivariate analysis are in bold.
*Significant at $p < 0.05$
** Significant at $p < 0.10$

BIBLIOGRAPHY

Adimora, A., Schoenbach, V., Bonas, D., Martinson, F., Donaldson, K., & Stancil, T. (2002). Concurrent sexual partnerships among women in the United States. *Epidemiology, 13*(3), 320-327.

Amaro, H., & Gornemann, I. (1991). Health care utilization for sexually transmitted diseases: influence of patient and provider characteristics. In J. Wasserheit, S. Aral, K. Holmes & P. Hitchcock (Eds.), *Research issues in human behavior and sexually transmitted diseases in the AIDS era* (pp. 140-160). Washington D.C.: American Society for Microbiology.

Aral, S., Fullilove, R., Coutinho, R., & Van Den Hoek, J. (1991). Demographic and societal factors influencing risk behaviors. In J. Wasserheit, S. Aral & K. Holmes (Eds.), *Research issues in human behavior and sexually transmitted diseases in the AIDS era* (pp. 161-176). Washington, DC: American Society for Microbiology.

Aral, S., & Wasserheit, J. (1998). Social and behavioral correlates of pelvic inflammatory disease. *Sexually Transmitted Diseases, 25*(7), 378-385.

ASHA. (2001). *Chlamydia screening: a new HEDIS measure important to your members.* Triangle Park, NC: American Social Health Association.

Ashing-Giwa, K. (1999). Health behavior change models and their socio-cultural relevance for breast cancer screening in African American women. *Women and Health, 28*(4), 53-71.

Bachanas, P., Morris, M., Lewis-Gess, J., Sarett-Cuasay, E., Sirl, K., & Ries, J. (2002). Predictors of risky sexual behavior in African American adolescent girls: implications for prevention interventions. *Journal of Pediatric Psychology, 27*(6), 519-530.

Banikarim, C., Chacko, M., Wiemann, C., & Smith, P. (2003). Gonorrhea and Chlamydia screening among young women: stage of change, decisional balance, and self-efficacy. *Journal of Adolescent Health, 32*, 288-295.

Barth, K., Cook, R., Downs, J., Switzer, G., & Fischhoff, B. (2002). Social stigma and negative consequences: factors that influence college students' decisions to seek testing for sexually transmitted infections. *Journal of American College Health, 50*(4), 153-159.

Adimora, A., Schoenbach, V., Bonas, D., Martinson, F., Donaldson, K., & Stancil, T. (2002). Concurrent sexual partnerships among women in the United States. *Epidemiology, 13*(3), 320-327.

Amaro, H., & Gornemann, I. (1991). Health care utilization for sexually transmitted diseases: influence of patient and provider characteristics. In J. Wasserheit, S. Aral, K. Holmes & P. Hitchcock (Eds.), *Research issues in human behavior and sexually transmitted diseases in the AIDS era* (pp. 140-160). Washington D.C.: American Society for Microbiology.

Aral, S., Fullilove, R., Coutinho, R., & Van Den Hoek, J. (1991). Demographic and societal factors influencing risk behaviors. In J. Wasserheit, S. Aral & K. Holmes (Eds.), *Research issues in human behavior and sexually transmitted diseases in the AIDS era* (pp. 161-176). Washington, DC: American Society for Microbiology.

Aral, S., & Wasserheit, J. (1998). Social and behavioral correlates of pelvic inflammatory disease. *Sexually Transmitted Diseases, 25*(7), 378-385.

ASHA. (2001). *Chlamydia screening: a new HEDIS measure important to your members*. Triangle Park, NC: American Social Health Association.

Ashing-Giwa, K. (1999). Health behavior change models and their socio-cultural relevance for breast cancer screening in African American women. *Women and Health, 28*(4), 53-71.

Bachanas, P., Morris, M., Lewis-Gess, J., Sarett-Cuasay, E., Sirl, K., & Ries, J. (2002). Predictors of risky sexual behavior in African American adolescent girls: implications for prevention interventions. *Journal of Pediatric Psychology, 27*(6), 519-530.

Banikarim, C., Chacko, M., Wiemann, C., & Smith, P. (2003). Gonorrhea and chlamydia screening among young women: stage of change, decisional balance, and self-efficacy. *Journal of Adolescent Health, 32*, 288-295.

Barth, K., Cook, R., Downs, J., Switzer, G., & Fischhoff, B. (2002). Social stigma and negative consequences: factors that influence college students' decisions to seek testing for sexually transmitted infections. *Journal of American College Health, 50*(4), 153-159.

Becker, M., Drachman, R., & Kirscht, J. (1974). A new approach to explaining sick-role behavior in low-income populations. *American Journal of Public Health, 64*, 204-216.

Blake, D., Kearney, M., Oakes, J., Druker, S., & Bibace, R. (2003). Improving participation in chlamydia screening programs: perspectives of high-risk youth. *Archives of Pediatric and Adolescent Medicine, 157*, 523-529.

Bloomfield, P., Kent, C., Campbell, D., Hanbrook, L., & Klausner, J. (2002). Community-based chlamydia and gonorrhea screening through the United States mail, San Francisco. *Sexually Transmitted Diseases, 29*(5), 294-297.

Boyer, C., Shafer, M., Wibbelsman, C., Seeberg, D., Teitle, E., & Lovell, N. (2000). Associations of sociodemographic, psychosocial, and behavioral factors with sexual risk and sexually transmitted diseases in teen clinic patients. *Journal of Adolescent Health, 27*(2), 102-111.

Brackbill, R., Sternberg, M., & Fishbein, M. (1999). Where do people go for treatment of sexually transmitted diseases? *Family Planning Perspectives, 31*(1), 10-15.

Burack, L., & Meyer, M. (1997). Using the health belief model to examine and predict college women's cervical cancer screening beliefs and behavior. *Health Care for Women International, 18*(3), 251-263.

Burstein, G., Gaydos, C., Diener-West, M., Howell, M., Zenilman, J., & Quinn, T. (1998). Incident chlamydia trachomatis infections among inner-city adolescent females. *JAMA, 280*, 521-526.

Burstein, G., & Murray, P. (2003). Diagnosis and Management of sexually transmitted disease pathogens among adolescents. *Pediatrics in Review, 24*(3), 75-82.

CDC. (1998). 1998 Guidelines for Treatment of Sexually Transmitted Diseases. *Morbidity and Mortality Weekly Report, 47*(RR-1).

CDC. (2001). *Tracking the hidden epidemics: trends in STDs in the United States, 2000*.

CDC. (2003). *Sexually transmitted disease surveillance*.

Chacko, M., Wiemann, C., & Smith, P. (2004). Chlamydia and gonorrhea screening in asymptomatic young women. *Journal of Pediatric and Adolescent Gynecology, 17*, 169-178.

Chumlea, W., Schubert, C., Roche, A., Kulin, H., Lee, P., Himes, J., et al. (2003). Age at menarche and racial comparisons in US girls. *Pediatrics, 111*(1), 110-113.

Clark, L., Jackson, M., & Allen-Taylor, L. (2002). Adolescent knowledge about sexually transmitted disease. *Sexually Transmitted Diseases, 29*(8), 436-443.

Cohen, D., Nsuami, M., Martin, D., & Farley, T. (1999). Repeated school-based screening for sexually transmitted diseases: a feasible strategy for reaching adolescents. *Pediatrics, 104*(6), 1281-1285.

Cohen, D., Spear, S., Scribner, R., Kissinger, P., Mason, K., & Wildgen, J. (2000). "Broken windows" and the risk of gonorrhea. *American Journal of Public Health, 90*(2), 230-236.

Cohen, S., Kamarack, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health Education and Social Behavior, 24*, 385-396.

Cohen, S., & Willamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health*. Newbury Park, CA: Sage1.

Cook, R., Wiesenfeld, H., Ashton, M., Krohn, M., Zamborsky, T., & Scholle, S. (2001). Barriers to screening sexually active adolescent women for chlamydia: a survey of primary care physicians. *Journal of Adolescent Health, 28*(3), 204-210.

Coyne-Beasley, T., Ford, C., Waller, M., Adimora, A., & Resnick, M. (2003). Sexually active students' willingness to use school-based health centers for reproductive health care services in North Carolina. *Ambulatory Pediatrics, 3*(4), 196-202.

Crosby, R., DiClemente, R., Wingood, G., Sionean, C., Harrington, K., & Davies, S. (2001). Psychosocial correlates of adolescents' worry about STD versus HIV infection: similarities and differences. *Sexually Transmitted Diseases, 28*(4), 208-213.

Crosby, R., DiClemente, R., Wingood, G., Sionean, C., Harrington, K., Davies, S., et al. (2001). Psychosocial correlates of adolescents' worry about STD versus HIV infection: similarities and differences. *Sexually Transmitted Diseases, 28*(4), 208-213.

Crosby, R., Yarber, W., & Meyerson, B. (1999). Perceived monogamy and type of clinic as barriers to seeking care for suspected STD or HIV infection: results from a brief survey of low-income women attending women, infants, and children (WIC) clinics in Missouri. *Sexually Transmitted Diseases, 26*(7), 399-403.

DiClemente, R., Wingood, G., Sionean, C., Crosby, R., Harrington, K., Davies, S., et al. (2002). Association of adolescents' history of sexually transmitted disease and their current high-risk behavior and STD status. *Sexually Transmitted Diseases, 29*(9), 503-509.

Dienes, C., Morrissey, S., & Wilson, A. (2004). Health care experiences of African American teen women in eastern North Carolina. *Family Medicine, 36*(5), 346-351.

Dorr, N., Krueckeberg, S., Strathman, A., & Wood, M. (1999). Psychosocial correlates of voluntary HIV antibody testing in college students. *AIDS Education and Prevention, 11*(1), 14-27.

Doswell, W., & Braxter, B. (2002). Risk-taking behaviors in early adolescent minority women: implications for research and practice. *Journal of the National Black Nurses Association, 11*(1), 51-57.

Doswell, W. M., & Braxter, B. (2002). Risk-taking behaviors in early adolescent minority women: implications for research and practice. *JOGNN, 31*(4), 454-461.

Ellen, J., Jennings, J., Meyers, T., Chung, S., & Taylor, R. (2004). Perceived social cohesion and prevalence of sexually transmitted diseases. *Sexually Transmitted Diseases, 31*(2), 117-122.

Ellen, J., Lane, M., & McCright, J. (2000). Are adolescents being screened for sexually transmitted diseases? A study of low-income African-American adolescents in San Francisco, California. *Sexually Transmitted Infections, 76*, 94-97.

Feroli, K., & Burstein, G. (2003). Adolescent sexually transmitted diseases. *The American Journal of Maternal Child Nursing, 28*(2), 113-118.

Fiscus, L., Ford, C., & Miller, W. (2004). Infrequency of sexually transmitted disease screening among sexually experienced US female adolescents. *Perspectives on Sexual and Reproductive Health, 36*(6), 233-238.

Ford, C., Jaccard, J., Millstein, S., Bardsley, P., & Miller, W. (2004). Perceived risk of chlamydial and gonoccocal infection among sexually experienced young adults in the United States. *Perspectives on Sexual and Reproductive Health, 36*(6), 258-264.

Ford, C., Jaccard, J., Millstein, S., Viadro, C., Eaton, J., & Miller, W. (2004). Young adults' attitudes, beliefs, and feelings about testing for curable STDs outside of clinic settings. *Journal of Adolescent Health, 34*, 266-269.

Ford, C., Viadro, C., & Miller, W. (2004). Testing for chlamydial and gonorrheal infections outside of clinic settings: a summary of the literature. *Sexually Transmitted Diseases, 31*(1), 38-51.

Fortenberry, J. (1997). Health care seeking behaviors related to sexually transmitted diseases among adolescents. *Journal of Adolescent Health, 25*(174-178).

Fortenberry, J., McFarlane, M., Bleakley, A., Bull, S., Fishbein, M., Grimley, D., et al. (2002). Relationships of stigma and shame to gonorrhea and human immunodeficiency virus screening. *American Journal of Public Health, 92*(378-381).

Fortenberry, J., & Zimet, G. (1999). Received social support for sexually transmitted disease-related care-seeking among adolescents. *Journal of Adolescent Health, 25*, 174-178.

Goodson, P., Evans, A., & Edmundson, E. (1997). Female adolescents and onset of sexual intercourse: a theory-based review of research from 1984 to 1994. *Journal of Adolescent Health, 21*(3), 147-156.

Greenberg, J., Magder, L., & Aral, S. (1992). Age at first coitus: a marker for sexual behavior in women. *Sexually Transmitted Diseases, 19*(6), 331-334.

Harawa, N., Greenland, S., Cochran, S., Cunningham, W., & Visscher, B. (2003). Do differences in relationship and partner attributes explain disparities in sexually transmitted disease among young white and black women? *Journal of Adolescent Health, 32*(3), 187-191.

Hogben, M., Bloom, F., McFarlane, M., St. Lawrence, J., Malotte, K., & Group, T. G. S. (2004). Factors associated with sexually transmitted disease clinic attendance. *International Journal of Nursing Studies, 41*, 911-920.

Hogben, M., St. Lawrence, J., Kasprzyk, D., Montano, D., Counts, G., McCree, D., et al. (2002). Sexually transmitted disease screenings by United States obstetricians and gynecologists. *Obstetrics and Gynecology, 100*(4), 801-807.

Holtgrave, D., & Crosby, R. (2003). Social capital, poverty, and income inequality as predictors of gonorrhoea, syphilis, chlamydia, and AIDS case rates in the United States. *Sexually Transmitted Infections, 79*, 62-64.

Hook, E., Richey, C., Leone, P., Bolan, G., Spalding, C., Henry, K., et al. (1997). Delayed presentation to clinics for sexually transmitted diseases by symptomatic patients: a potential contributor to continuing STD morbidity. *Sexually Transmitted Diseases, 24*(8), 443-448.

Howell, M., Quinn, T., & Gaydos, C. (1998). Screening for chlamydia trachomatis in asymptomatic women attending family planning clinics: a cost-effectiveness analysis of three strategies. *Annals of Internal Medicine, 128*(4), 277-284.

HP. (1999). *Healthy People 2010, Focus Area #25: Sexually Transmitted Diseases*.

Hsieh, Y., Howell, M., Gaydos, C., McKee, K., & Quinn, T. (2003). Preference among female army recruits for use of self-administered vaginal swabs or urine to screen for *Chlamydia trachomatis* genital infections. *Sexually Transmitted Diseases, 30*(10), 769-773.

Huppert, J., & Hillard, P. (2003). Sexually transmitted disease screening in teens. *Current Women's Health Reports, 3*, 451-458.

Ickovics, J., Grigorenko, E., Beren, S., Druley, J., Morrill, A., & Rodin, J. (1998). Long-term effects of HIV counseling and testing for women: behavioral and psychological consequences are limited at 18 months posttest. *Health Psychology, 17*(5), 395-402.

IOM. (1997). *The Hidden Epidemic: Confronting Sexually Transmitted Diseases*. Washington, D.C.: National Academy Press.

James, A., Campbell, M., & Hudson, M. (2002). Perceived barriers and benefits to colon cancer screening among African Americans in North Carolina: how does perception related to screening behavior. *Cancer Epidemiology, Biomarkers, and Prevention, 11*, 529-534.

Janz, N., & Becker, M. (1984). The health belief model: a decade later. *Health Education Quarterly, 11*(1), 1-47.

Janz, N., Champion, V., & Strecher, V. (2002). The health belief model. In K. Glanz, B. Rimer & F. Lewis (Eds.), *Health behavior and health education* (Third ed., pp. 45-66). San Francisco: Jossey-Bass.

Kahn, R., Moseley, K., Thilges, J., Johnson, G., & Farley, T. (2003). Community-based screening and treatment for STDs: results from a mobile clinic initiative. *Sexually Transmitted Diseases, 30*(8), 654-658.

Kelley, S., Boawski, E., Flocke, S., & Keen, K. (2003). The role of sequential and concurrent sexual relationships in the risk of sexually transmitted diseases among adolescents. *Journal of Adolescent Health, 32*(4), 296-305.

Kelly, J., St. Lawrence, J., Brasfield, T., Lemke, A., Amidei, T., Roffman, R., et al. (1990). Psychological factors that predict AIDS high-risk versus AIDS precautionary behavior. *Journal of Consulting and Clinical Psychology, 58*(1), 117-120.

Kent, C., Branzuela, A., Fischer, L., Bascom, T., & Klausner, J. (2002). Chlamydia and gonorrhea screening in San Francisco high schools. *Sexually Transmitted Diseases, 29*(7), 373-375.

Kershaw, T., Ickovics, J., Lewis, J., Niccolai, L., Milan, S., & Ethier, K. (2004). Sexual risk following a sexually transmitted disease diagnosis: the more things change the more they stay the same. *Journal of Behavioral Medicine, 27*(5), 445-461.

Kershaw, T. S., Ethier, K. A., Niccolai, L. M., Lewis, J. B., & Ickovics, J. R. (2003). Misperceived risk among female adolescents: social and psychological factors associated with sexual risk accuracy. *Health Psychology, 22*(5), 523-532.

KFF. (2003). *Fact Sheet: Sexually transmitted diseases in the US.*

Kim, J., & Mueller, C. (1978). *Factor analysis: statistical methods and practical issues.* Beverly Hills: Sage Publications.

Kohl, K., Markowitz, L., & Koumans, E. (2003). Developments in the screening for *Chlamydia trachomatis:* a review. *Obstetrics and Gynecology Clinics of North America, 30*, 637-658.

Lally, M., Alvarex, S., Macnevin, R., Cenedella, C., Dispigno, M., Harwell, J., et al. (2002). Acceptability of sexually transmitted infection screening among women in short-term substance abuse treatment. *Sexually Transmitted Diseases, 29*(12), 752-755.

Lane, M., McCright, J., Garrett, K., Millstein, S., Bolan, G., & Ellen, J. (1999). Features of sexually transmitted disease services important to African American adolescents. *Archives of Pediatric and Adolescent Medicine, 153*, 829-833.

Lichenstein, B. (2003). Stigma as a barrier to treatment of sexually transmitted infection in the American deep south: issues of race, gender, and poverty. *Social Science and Medicine, 57*, 2435-2445.

Lowery, L., Chung, S., & Ellen, J. (2005). Social support and sexually transmitted disease related healthcare utilisation in sexually experienced African-American adolescents. *Sexually Transmitted Infections, 81*, 63-66.

Lyss, S., Kamb, M., Peterman, T., Moran, J., Newman, D., Bolan, G., et al. (2003). *Chlamydia trachomatis* among patients infected with and treated for *Neisseria gonorrhoeae* in sexually transmitted disease clinics in the United States. *Annals of Internal Medicine, 139*(3), 178-185.

Marin, B. V., Coyle, K. K., Gomez, C. A., Carvajal, S. C., & Kirby, D. B. (2000). Older boyfriends and girlfriends increase risk of sexual initiation in young adolescents. *Journal of Adolescent Health, 27*(6), 409-418.

Marrazzo, J., Fine, D., Celum, C., DeLisle, S., & Handsfield, H. (1997). Selective screening for chlamydia infection in women: a comparison of three sets of criteria. *Family Planning Perspectives, 29*(4), 158-162.

McBride, C. K., Paikoff, R. L., & Holmbeck, G. N. (2003). Individual and familial influences on the onset of sexual intercourse among urban african american adolescents. *Journal of Consulting and Clinical Psychology, 71*(1), 159-167.

Mehta, S., Shahan, J., & Zenilman, J. (2000). Ambulatory STD management in an inner-city emergency department. *Sexually Transmitted Diseases, 27*(3), 154-158.

Miller, K., Forehand, R., & Kotchick, B. (2000). Adolescent sexual behavior in two ethnic minority groups: a multisystem perspective. *Adolescence, 35*(138), 313-333.

Miller, W. (1998). Screening for chlamydial infection: a model program based on prevalence. *Sexually Transmitted Diseases, 25*(4), 201-210.

Miller, W., Hoffman, I., O'Dowd, J., McPherson, J., Privette, A., Schmitz, J., et al. (2000). Selective screening for chlamdydial infection: which criteria to use? *American Journal of Preventive Medicine, 18*(2), 115-122.

Millstein, S., Igra, V., & Gans, J. (1996). Delivery of STD/HIV preventive services to adolescents by primary care physicians. *Journal of Adolescent Health, 19*(4), 249-257.

MMWR. (1993). *Recommendations for the prevention and management of Chlamdyia trachomatis infections*. Atlanta.

MMWR. (2002). Sexually transmitted diseases treatment guidelines 2002. *Morbidity and Mortality Weekly Report, 51*.

Monroe, K., Wiess, H., Jones, M., & Hook, E. (2003). Acceptability of urine screening for Neisseria gonorrheae and Chlamydia trachomatis in adolescents in an urban emergency department. *Sexually Transmitted Diseases, 30*(11), 850-853.

Mosher, W., & Aral, S. (1991). Testing for sexually transmitted diseases among women of reproductive age: United States, 1988. *Family Planning Perspectives, 23*(5), 216-221.

Moss, N., Gallaread, A., Siller, J., & Klausner, J. (2004). "Street medicine": collaborating with a faith-based organization to screen at-risk youths for sexually transmitted diseases. *American Journal of Public Health, 94*(7), 1081-1084.

Neff, J., & Crawford, S. (1998). The health belief model and HIV risk behaviours: a causal model analysis among Anglos, African Americans, and Mexican Americans. *Ethnicity and Health, 3*(4), 283-300.

Newbern, E., Miller, W., Schoenbach, V., & Kaufman, J. (2004). Family socioeconomic status and self-reported sexually transmitted diseases among black and white American adolescents. *Sexually Transmitted Diseases, 31*(9), 533-541.

NIAID. (2002). *Gonorrhea*, from www.niaid.gov/factsheets/stdgon.htm

NIAID. (2004). *Chlamydia*, from www.niaid.nih.gov/factsheets/stdclam.htm

Oh, M., Smith, K., O'Cain, M., Kilmer, D., Johnson, J., & Hook, E. (1998). Urine-based screening of adolescents in detention to guide treatment for gonococcal and chlamydial infections: translating research into intervention. *Archives of Pediatric and Adolescent Medicine, 152*, 52-56.

O'Sullivan, L., Meyer-Bahlburg, H., Nat, R., & Watkins, B. (2000). Social cognitions associated with pubertal development in a sample of urban, low-income, African-American and Latina girls and mothers. *Journal of Adolescent Health, 27*, 227-235.

O'Sullivan, L. F., Meyer-Bahlburg, H., Nat, R., & Watkins, B. X. (2000). Social cognitions associated with pubertal development in a sample of urban, low-income, african-american and latina girls and mothers. *Journal of Adolescent Health, 27*, 227-235.

Padian, N., Shiboski, S., & Hitchcock, P. (1991). Risk factors for acquisition of sexually transmitted diseases and development of complications. In J. Wasserheit, S. Aral & K. Holmes (Eds.), *Research issues in human behavior and sexually transmitted diseases in the AIDS era* (pp. 83-96). Washington, DC: American Society for Microbiology.

Paradise, J. E., Cote, J., Minsky, S., Lourenco, A., & Howland, J. (2001). Personal values and sexual decision-making among virginal and sexually experienced urban adolescent girls. *Journal of Adolescent Health, 28*(5), 404-409.

Quadagno, D., Sly, D., Harrison, D., Eberstein, I., & Soler, H. (1998). Ethnic differences in sexual decisions and sexual behavior. *Archives of Sexual Behavior, 27*(1), 57-75.

Radloff, L. (1977). The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.

Radloff, L. (1991). The Use of the Center for Epidemiologic Studies Depression Scale in Adolescents and Young Adults. *Journal of Youth and Adolescence, 20*(2), 149-165.

Ramirez-Valles, J., Zimmerman, M., & Newcomb, M. (1998). Sexual risk behavior among youth: modeling the influence of prosocial activities and socioeconomic factors. *Journal of Developmental and Behavioral Pediatrics, 18*(3), 158-161.

Ren, X., Skinner, K., Lee, A., & Lewis, K. (1999). Social support, social selection and self-assessed health status: results from the veterans health study in the United States. *Social Science and Medicine, 48*, 1721-1734.

Richardson, E., Sellors, J., Mackinnon, S., Woodcox, V., Howard, M., Jang, D., et al. (2003). Prevalence of Chlamydia trachomatis infections and specimen preference among women, using self-collected vaginal swabs in community settings. *Sexually Transmitted Diseases, 30*(2), 880-885.\

Rickert, V., Sanhvi, R., & Wiemann, C. (2002). Is lack of sexual assertiveness among adolescent and young adult women a cause for concern? *Perspectives on Sexual and Reproductive Health, 34*(4), 178-183.

Rietmeijer, C., Bull, S., Ortiz, C., Leroux, T., & Douglas, J. (1998). Patterns of general health care and STD services among high-risk youth in Denver participating in community-based urine chlamydia screening. *Sexually Transmitted Diseases, 25*(9), 457-463.

Rosenstock, I. (1974). Historical origins of the health belief model. *Health Education Monographs, 2*(4), 328-335.

Rosenstock, I., Strecher, V., & Becker, M. (1994). The Health belief model and the HIV risk behavior change. In R. DiClemente & J. Peterson (Eds.), *Preventing AIDS: Theories and methods of behavioral interventions* (pp. 2-24). New York: Plenum Press.

Rosenthal, S. L., Von Ranson, K. M., Cotton, S., Biro, F. M., Mills, L., & Succop, P. A. (2001). Sexual initiation: predictors and developmental trends. *Sexually Transmitted Diseases, 28*(9), 527-532.

Rosner, B. (2000). *Fundamentals of Biostatistics* (5th ed.). Pacific Grove: Brooks/Cole.

Santelli, J. S., Kaiser, J., Hirsch, L., Radosch, A., Simkin, L., & Middlestadt, S. (2004). Initiation of sexual intercourse among middle school adolescents: the influence of psychosocial factors. *Journal of Adolescent Health, 34*(3), 200-208.

Scholes, D., Stergachis, A., Heidrich, F., Andrilla, H., Holmes, K., & Stamm, W. (1996). Prevention of pelvic inflammatory disease by screening for cervical chlamydial infection. *New England Journal of Medicine, 334*(21), 1362-1366.

Seidman, S., Mosher, W., & Aral, S. (1994). Predictors of high-risk behavior in unmarried American women: adolescent environment as risk factor. *Journal of Adolescent Health, 15*(2), 126-132.

Shafii, T., & Burstein, G. R. (2004). An overview of sexually transmitted infections among adolescents. *Adolescent Medicine Clinics, 15*, 201-214.

Shih, S., Scholle, S., Irwin, K., Tao, G., Walsh, C., & Tun, W. (2004). *Chlamydia screening among sexually active young female enrollees of health plans - United States, 1999-2001*: Centers for Disease Control and Prevention.

Shrier, L. (2004). Sexually transmitted diseases in adolescents: biologic, cognitive, psychologic, behavioral, and social issues. *Adolescent Medicine Clinics, 15*, 215-234.

Sionean, C., DiClemente, R., Wingood, G., Crosby, R., & Cobb, B. (2001). Socioeconomic status and self-reported gonorrhea among African-American female adolescents. *Sexually Transmitted Diseases, 28*(4), 236-239.

Smith, K., Harrington, K., Wingood, G., Oh, M., Hook, E., & DiClemente, R. (2001). Self-obtained vaginal swabs for diagnosis of treatable sexually transmitted diseases in adolescent girls. *Archives of Pediatric and Adolescent Medicine, 155*(6), 676-679.

Spencer, J. M., Zimet, G. D., Aalsma, M. C., & Orr, D. P. (2002). Self-esteem as a predictor of initiation of coitus in early adolescents. *Pediatrics, 109*(4), 581-584.

St. Lawrence, J., Montano, D., Kasprzyk, D., Phillips, W., Armstrong, K., & Leichliter, J. (2002). STD screening, testing, case reporting, and clinical and partner notification practices: a national survey of US physicians. *American Journal of Public Health, 92*(11), 1784-1788.

Stamm, W. (1999). *Chlamydia trachomatis* infections of the adult. In K. Holmes, P. Mardh, P. Sparling, S. Lemon, W. Stamm, P. Piot & J. Wasserheit (Eds.), *Sexually Transmitted Diseases* (Third ed.): McGraw-Hill.

Sun, S., Schubert, C., Chumlea, W., Roche, A., Kulin, H., Lee, P., et al. (2002). National estimates of the timing of sexual maturation and racial differences among US children. *Pediatrics, 110*(5), 911-919.

Suss, A., Homel, P., Hammerschlag, M., & Bromberg, K. (2000). Risk factors for Pelvic Inflammatory Disease in inner-city adolescents. *Sexually Transmitted Diseases, 27*(5), 289-291.

Sydney, E., Patterson, L., Hadley, W., Barnard, M., & Alpert, B. (2000). Racial differences in adolescents' perceived vulnerability to disease and injury. *Journal of Behavioral Medicine, 23*(5), 421-435.

Tebb, K., Paukku, M., Pai-Dhungat, M., Gyamfi, A., & Shafer, M. (2004). Home STI testing: the adolescent female's opinion. *Journal of Adolescent Health, 35*, 462-467.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: understanding concepts and applications* (1st ed.). Washington, DC: American Psychological Association.

Tilson, E., Sanchez, V., Ford, C., Smurzynski, M., Leone, P., Fox, K., et al. (2004). Barriers to asymptomatic screening and other STD services for adolescents and young adults: focus group discussions. *BioMed Central Public Health, 4*, e21.

Torkko, K., Gershman, K., Crane, L., Hamman, R., & Baron, A. (2000). Testing for chlamydia and sexual history taking in adolescent females: results from a statewide survey of Colorado primary care providers. *Pediatrics, 106*(3), e32.

USPSTF. (2001). *Screening for chlamydial infection*. Rockville, MD: US Preventive Services Task Force.

Wallston, K., Wallston, B., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scales. *Health Education Monographs, 6*(2), 160-171.

Wang, L., Burstein, G., & Cohen, D. (2002). An economic evaluation of a school-based sexually transmitted disease screening program. *Sexually Transmitted Diseases, 29*(12), 737-745.

Wingood, G., & DiClemente, R. (1998). Partner influences and gender-related factors associated with noncondom use among young adult African-American women. *American Journal of Community Psychology, 26*(1), 29-51.

Wong, D., Berman, S., Furness, B., Gunn, R., M, & Peterman, T. (2005). Time to treatment for women with chlamydial or gonococcal infections: a comparative evaluation of sexually transmitted disease clinics in 3 US cities. *Sexually Transmitted Diseases, 32*(3), 194-198.

Zak-Place, J., & Stern, M. (2004). Health belief factors and dispositional optimism as predictors of STD and HIV preventive behavior. *Journal of American College Health, 52*(5), 229-236.