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Partner Notification and Treatment of Chlamydia and Gonorrhea in African American Adolescent Women

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Partner Notification and Treatment of Chlamydia and Gonorrhea in African American Adolescent Women

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2007

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An abstract of
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Abstract

Partner Notification and Treatment of Chlamydia and Gonorrhea in African American Adolescent Women
By Anna Buchsbaum, MD

African American adolescent women in the Southern United States carry a disproportionately high burden of Chlamydia and gonorrhea infections when compared to women of the same age but of different race/ethnicity or geographic location. Additionally, Chlamydia and gonorrhea re-infection rates are 1.7 times higher in adolescents than in older women. Successfully reducing re-infection rates may lead to lower overall prevalence of disease. However, decreasing re-infection rates is contingent on successful partner notification and partner treatment. Therefore, understanding the factors that influence partner notification and treatment is critical.

This study aimed to 1) describe preferences for different partner notification and treatment strategies; 2) identify the individual, relationship, and other psychosocial factors associated with high self-efficacy for partner notification; 3) describe the proportion of adolescents in this high risk population who are re-infected with a sexually transmitted infection (STI) and; 4) identify the factors associated with whether an infected patient notified her partner of a positive STI diagnosis.

This was a prospective cohort study. Of the 350 participants recruited at baseline 85.1% (297) would prefer telling their partner about an STI diagnosis themselves versus having a health care provider tell their partner. Seventy-one percent (247) would prefer to bring their partner to the clinic for treatment instead of giving him pills or a prescription to fill. Ninety-three (26.7%) were STI positive at baseline and 55 of these participated in a follow up survey. At follow-up the proportion of positive repeat STI tests was 23.9%. High self-efficacy for partner notification of a positive STI diagnosis was seen in older, participants with fewer lifetime sexual partners who were in a serious relationship at the time of enrollment.

STI re-infection rates in African American Adolescent women are high. Traditional methods for partner notification and treatment may not be adequate in this population. Therefore, Alternative strategies for partner notification and treatment like offering male partners concurrent clinic appointments may improve partner treatment rates and decrease reinfection.

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Chapter 1: Introduction

African American adolescent women in the Southern United States carry a disproportionately high burden of Chlamydia and gonorrhea infections when compared to women of the same age but of different race/ethnicity or geographic location [1]. Additionally, re-infection rates, defined as re-acquiring the same infection from an untreated partner, are significantly higher in adolescents than in older women [2]. These high re-infection rates may contribute to the high prevalence of disease in this population [3]. To reduce re-infection rates, and therefore disease prevalence, partners of infected patients must be treated for the appropriate sexually transmitted infection (STI). For treatment to occur, partners of infected patients must first be notified. This study aimed to 1) describe preferences for different partner notification and treatment strategies; 2) identify the individual, relationship, and other psychosocial factors associated with high self-efficacy for partner notification; 3) describe the proportion of adolescents in this high risk population who are re-infected with an STI and; 4) identify the factors associated with whether an infected patient notified her partner of a positive STI diagnosis.

Chlamydia infection rates in African American adolescent women aged 15-19 years old are six times higher than white adolescent females [1]. Similarly gonorrhea infection rates in this population are 14-16 times higher than their white female counterparts [1, 4]. This race-based disparity is compounded even further by geography. Adolescents of all ages in the Southern United States have a higher burden of STIs than in any other geographical region [1]. In addition, re-infection rates are higher in adolescents than in older women. Seventeen percent of 10-19 year olds are re-infected

within 2 years versus 4-10% for those greater than 20 years [2]. These high re-infection rates may contribute significantly to the high rates of disease seen in this population [2].

Partner notification and partner treatment are crucial to prevent recurrent infection. Traditionally partners of patients diagnosed with an STI are notified and referred to medical treatment by the infected person (patient referral) or by a medical provider (provider referral) [3]. However, given the persistently high rates of Chlamydia and gonorrhea it appears that these traditional management schemes may not be as successful as expected. Sixty to 75 percent of adolescent girls report notifying their partners of a positive STI diagnosis. However, only 25-55% of those who reported notifying their partners also reported that their partners were treated [5, 6].

Previous studies have shown that there are individual and relationship characteristics that correlate with increased partner notification of an STI diagnosis [5-7]. Several studies have suggested that older age, and having one steady partner are associated with an increased likelihood of partner notification [6]. Recent studies that address improving partner treatment and decreasing re-infection rates have focused on the implementation of expedited partner therapy (EPT) [8, 9]. However, EPT is not universally available in the United States, it is explicitly legal in only 32 states, and may be less effective for younger people with multiple partners [3, 10]. Therefore, we must take a step back and re-examine what factors influence successful partner notification and successful partner treatment particularly in a population at high risk for infection and re-infection.

Thus, this study explored the preferences for partner notification and treatment strategies (i.e., patient referral, provider referral, EPT) among sexually active adolescent

African American females prior to their knowledge of an STI diagnosis. We also examined the individual (e.g., age, in school, sexual and reproductive health history, self-efficacy), relationship (e.g., status, type, length, communication), and psychosocial factors (e.g., substance use, education, employment, health insurance, perception of STI status) associated with self-efficacy for partner notification among adolescent African American females prior to their knowledge about an STI diagnosis. Further, we examined the individual, relationship, and psychosocial factors associated with patient-reported partner notification among adolescent African American females subsequent to being diagnosed with Chlamydia or gonorrhea. STI re-infection rates and overall burden of disease in Southern African American adolescent women may start to decrease only when we've identified these key factors, and changed the focus of our counseling and interventions appropriately.

This study is framed within the Social Ecologic Model (SEM) (Figure 1) [11]. This perspective takes into account the multifaceted influences on adolescent sexual risk-taking behavior and decision-making. This model proposes that multiple levels influence behavior and decision-making. SEM is grounded in the idea that behavior is affected by individual, relationship/interpersonal, community/institutional and societal/policy level influences [11]. For interventions to achieve substantial changes in health behaviors they should take into account all of these levels. Examples of individual level factors are a person's knowledge, attitudes, and beliefs about a particular health behavior. Relationship or interpersonal factors might include family, friends, peers, and romantic partners. Examples of community or institutional level factors include rules, regulations, and structures both formal and informal that govern schools, hospitals, workplaces, and

other institutions. Finally societal level factors include local, state, and federal policies and laws that influence health behaviors [12].

An important concept of the SEM is that influences interact across levels [11]. Using the health behavior problem identified here, partner notification and treatment after a positive STI diagnosis, as an example, individual level factors might include age and self-efficacy for partner notification. Relationship level factors might include duration and type of relationship. Community and institutional level factors might include clinic policies and standards. Societal level factors might include government level recommendations about how to counsel patients with positive STI diagnoses. When considering how these factors interact with one another to influence the behavior of an individual with a positive STI diagnosis one can imagine that a person with higher self-efficacy for partner notification may be more likely to notify her partner but what she tells her partner would depend on how she was counseled by the clinic which in turn is influenced by government level recommendations.

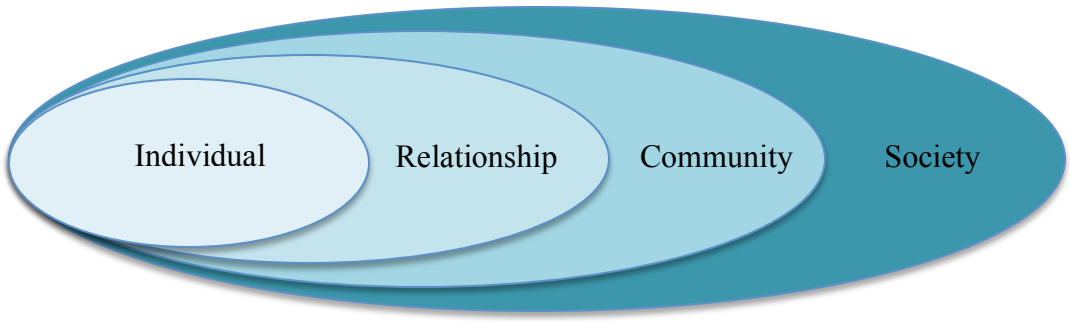


Figure 1: The Social Ecologic Model

DiClemente and colleagues have found that adopting an ecological model as opposed to individual level models have been beneficial in reducing sexual risk-taking behaviors in adolescents [13, 14]. Health behavior interventions using an ecological approach including individual, relationship, community, and society influences have led to improved long term effectiveness of interventions to influence STI/HIV preventive and contraceptive behaviors in adolescent women [13, 14]. Thus, using the SEM as the theoretical framework for this study allowed for the examination of individual behavior and decision-making, romantic relationships, clinic environment and policies, and state policies on the decision to notify a partner of a positive STI diagnosis and on partner treatment for that STI.

Chapter 2: Literature Review

Epidemiology of Chlamydia and gonorrhea infections

Chlamydia and gonorrhea are the first and second most commonly reported notifiable diseases in the United States [15, 16]. Both are bacterial STIs and are often asymptomatic. When left untreated these infections can lead to more serious problems like pelvic inflammatory disease (PID), ectopic pregnancy, chronic pelvic pain, and tubal infertility. According to the Centers for Disease control and Prevention's (CDC) Sexually Transmitted Disease Surveillance 2011 there were 1,412,791 cases of Chlamydia reported in the United States corresponding to 457.6 cases per 100,000 population. There were 321,849 cases of gonorrhea reported in the United States, corresponding to a rate of 104.2 cases per 100,000 population. Rates of both infections were shown to increase between 2010 and 2011 [4].

In 2011 the rates of gonorrhea and Chlamydia in adolescent women age 15-19 in the United States were second only to those age 20-24 and were 556.5/100,000 females for gonorrhea and 3,416.5/100,000 females for Chlamydia [4]. African American adolescent women have higher rates of STIs that are significantly higher than those of white adolescent women [1, 15]. Chlamydia rates among African American women age 15-19 are 7507.1/1000,000 females, 6 times higher than for white women in the same age group [1, 15]. Gonorrhea rates among African American women age 15-19 are 1,929.6/100,000 females, almost 16 times the rate among the same aged white women [15].

Re-infection

STI re-infection refers to re-acquiring the same STI from an untreated sexual partner. This should be differentiated from repeat or recurrent STI infection, which refers to acquiring another STI either from a different partner or the same partner who has been repeatedly infected. A third alternative to consider is a persistent STI infection that has failed antibiotic treatment. It is difficult to determine with accuracy the difference between these three alternatives.

STI re-infection rates have not been clearly defined in the literature. A recent review by Hosenfeld et. al. cites the rate of re-infection for Chlamydia to range from 0%-32% with a median of 13.9% for all age groups [17]. Similarly gonorrhea re-infection rates ranged from 2.6%-40% with a median of 11.7% [17]. Several other studies have reported the rates of STI re-infection to be as high as 53% [18, 19]. Hosenfeld and colleagues also reported that younger age was consistently associated with STI re-infection. Several previous studies have shown adolescent women to have higher rates of re-infection and repeat infection of both gonorrhea and Chlamydia than older women [2, 18, 20-22]. It is important to reduce the number of repeat STI infections and re-infections because the risk of ectopic pregnancy, PID and therefore infertility increase with a history of more than one Chlamydia infection [23].

Importance of partner notification

Partner notification of a positive STI diagnosis can be accomplished in two ways, either by a healthcare provider or by the infected patient. Infected individuals prefer to tell their partners themselves [24] instead of having a healthcare provider do it for them. A recent study by Kretzschmar et. al. used modeling to evaluate the impact of increased

screening and partner notification on Chlamydia positivity in Region X (Alaska, Idaho, Oregon, and Washington) in the United States [25]. They found a 23% reduction in positivity by either increasing screening by 3-fold or increasing partner notification by 2-fold [25]. Partner notification and screening for Chlamydia are equally important for decreasing re-infection rates.

Previous treatment approaches

In order to prevent the spread and re-infection of gonorrhea and Chlamydia a number of notification and treatment approaches have been tried including both provider and patient driven methods. Provider driven methods include any approach in which a health care professional informs an infected patient's partner(s) of the infection and need for treatment. In patient driven methods, infected patients are responsible for notifying their partner(s) of the diagnosis and need for treatment. One patient driven method, EPT is becoming increasingly popular and has been endorsed by both the American College of Obstetricians and Gynecologists (ACOG) and the CDC [10, 26].

EPT is defined as the treatment of partners prior to an assessment by a health care provider [10]. EPT involves providing infected patients with medication or a prescription for medication to give directly to their partners [10]. Although EPT has been shown to reduce repeat Chlamydia and gonorrhea infections [27, 28] there are still many barriers and concerns regarding its implementation [3, 10, 29]. There are legal and financial considerations as well as the need for provider, patient, and partner participation in order to maximize uptake [3, 10, 29]. While facilitating expedient treatment, the use of EPT does not eliminate the need for partner notification. As with other management schemes, the use of EPT still requires the infected patient to notify her partner.

Thus, it is imperative that we better understand what influences both partner notification and partner treatment. STI re-infection rates in Southern African American female adolescents may start to decrease when we've identified key factors associated with partner notification, changed the focus of our counseling appropriately to support successful partner notification, and removed potential barriers for partner treatment. Therefore, understanding what leads to successful partner notification of an STI diagnosis and successful partner action (e.g., getting tested, taking medication) may help improve outcomes of both traditional management schemes and EPT.

Importance of relationship issues

Several recent studies have identified relationship status as an important factor in decreasing Chlamydia and gonorrhea re-infection rates. Mercer et. al. developed an algorithm to quantify partner notification impact, defined as the absolute reduction in onward transmission of infection and the number needed to treat to interrupt transmission [30]. They found a greater impact when partner notification targeted casual partners versus regular or live in partners [30]. The treatment of a regular or live in partner will reduce the likelihood of re-infection for one infected patient. However, the successful treatment of a casual partner will prevent more secondary transmissions per partnership and will therefore have a greater public health impact [30].

Swartzendruber et. al. have added to the evidence that relationship status impacts Chlamydia and gonorrhea re-infection rates [19]. After following adolescent African-American women with a positive Chlamydia or gonorrhea test every 6 months for 2 years they found that having a boyfriend was associated with a decreased likelihood of repeat infection [19].

Prior studies of partner notification among adolescents

There have been prior studies evaluating partner notification practices among adolescents. In a study by Fortenberry et. al., adolescent males and females being treated for Chlamydia, gonorrhea, trichomonas, or non-gonococcal urethritis were surveyed on the day of treatment and one month later [5]. The purpose of this study was to evaluate the role of partner familiarity, notification self-efficacy, anticipated negative consequences of notification, and relationship quality in sex partner notification within one month of treatment. Relationship quality in this study referred to intimate aspects of a couple's relationship outside of their sexual interaction [5]. Two factors were identified that led to increased partner notification of an STI diagnosis: 1) higher STI notification self-efficacy, and 2) relationships with stronger affiliative and emotional ties. Age, race/ethnicity, coital frequency, and anticipated negative consequences were not associated with partner notification in this study. Partner treatment and re-infection were not considered [5].

In another study Lim et. al., identified adolescent girls with a positive Chlamydia test and showed a trend towards increased partner notification for girls 18 years or older and for those with only one lifetime partner [6]. This study also looked at partner treatment rates as reported by the patient and found that of the 75% of partners that were notified 54% were reported to have been treated. Additionally, they also examined the content and context of the communication between partners to identify why girls decided to tell their partners and what happened when they told their partners. They found that self-protection from re-infection was a common reason for notification and that the majority of partners accepted the news well [6].

Although informative these studies do not specifically examine the population at highest risk for incident and subsequent Chlamydia and gonorrhea infection, African American adolescent females in the Southern United States. Additionally previous studies have looked at participants who have already been diagnosed with an STI and the participant characteristics and psychosocial factors associated with subsequent partner notification. Thus, our patient population will consist of African American adolescent females in the Southern United States. We will compare participants before and after being told of their positive STI diagnosis thereby identifying factors that can be used for preventive interventions. We will 1) describe preferences for different partner notification and treatment strategies; 2) identify the individual, relationship, and other psychosocial factors associated with high self-efficacy for partner notification; 3) describe the proportion of adolescents in this high risk population who are re-infected with an STI and; 4) identify the factors associated with whether an infected patient notified her partner of a positive STI diagnosis.

We hypothesize that among sexually active African American adolescent females without a known STI diagnosis self-identification of being in a relationship will be associated with high self-efficacy for partner notification. Additionally we hypothesize that among sexually active African American adolescent females with a recent positive STI diagnosis self-identification of being in a relationship will also be associated with a higher likelihood of self-reported partner notification. We hypothesize that the proportion of STI infection and re-infection will be similar to what has previously been reported in the literature for this high-risk population. And finally we hypothesize that

participants will prefer alternative methods for partner notification and treatment when compared to EPT.

Chapter 3: Methods

This was a nested cohort study of a larger cross-sectional study assessing dual protection use in sexually active adolescent African American women in the Southern United States (Table 1). The research was conducted in Atlanta, Georgia at Grady Memorial Hospital in the Teen Services clinic. This clinic receives support from the Title X Family Planning Grant and provides services to patients up to the age of 19. The clinic provides comprehensive sexual and reproductive health counseling, including a full range of contraceptive counseling and supplies, STI screening, testing and treatment, and general women's health maintenance. In 2008, 97% of females served (N=1,597) in the Teen Services clinic were less than 19 years old. The vast majority (95%) of clients were African American and 85% were female.

The study population consists of sexually active, self-identified African American females ages 14-19 years old. To be eligible for participation in the baseline cross-sectional study Teen Services clinic clients had to fit the following criteria: female, African American or of mixed-race including African-American (self-identified), English speaking, born in the United States aged 14-19, sexually active (defined as having had vaginal intercourse with a male partner in the past six months), presented to the Teen Services Clinic for family planning or reproductive health services, willing to provide written, informed consent if age ≥18, willing to provide written, informed assent if 14-17 years of age.

Table 1: Study Design

	Dual Protection with Baseline Nested Cohort Survey	**Follow-up Survey of STI+ Participants**
Sample	350 AA females 14-19 attending a Title X clinic	55 AA females 14-19 with positive Chlamydia or gonorrhea test at baseline
Biological Data	Urine pregnancy test. Urine Chlamydia and gonorrhea tests	Urine Chlamydia and gonorrhea tests.
Data collection tool	Baseline ACASI structured survey	Follow-up ACASI structured survey
Measures	Demographics, Relationship characteristics, STI and pregnancy history, peer norms, sexual history, Partner notification and treatment preferences, self-efficacy of partner notification	Partner notification, partner's response to notification, partner treatment
Follow-up	3 months for STI+ participants (nested cohort only)	None

Recruitment for the baseline study took place over 6 months from April 2012 through September 2012. All female clients presenting for an appointment at the Teen Services Clinic at Grady Memorial Hospital were approached by a member of the study team and invited to participate in the baseline study. If the client was interested, the staff member discussed the study with her in a private location and screened her for eligibility. If eligible, consent or assent was obtained and she was enrolled in the study. All participants were compensated for their time with a $20 gift card. The baseline study included the administration of a structured survey and collection of urine samples for

tests for pregnancy, Chlamydia, and gonorrhea testing. Institutional Review Board (IRB) approval was obtained from Emory University School of Medicine and the Centers for Disease Control and Prevention.

Participants who screened positive for Chlamydia or gonorrhea at baseline were contacted by clinic staff and notified of their test results as per clinic standard of care. They were counseled and treated based on CDC recommended treatment guidelines which includes recommending a test for re-infection three months after treatment [31]. Clinic standard protocol consists of making follow-up appointments every three months for patients.

Participants who tested positive for an STI at baseline were eligible to participate in the follow up study. They were contacted by a study staff member via telephone and invited to participate in a three-month follow-up study. All attempts were made to coordinate the follow-up study visit with the three-month clinic appointment. Consent or assent was collected in person at the follow-up visit prior to enrollment in the follow-up study. Participants were compensated with an additional $20 gift card. A structured survey was administered and a urine sample was collected for a test for re-infection. Institutional Review Board (IRB) approval was obtained from Emory University School of Medicine and the Centers for Disease Control and Prevention.

Baseline survey questions for the nested cohort study were integrated into the survey of the larger cross-sectional study (Appendix A). Participants used a tablet computer to complete an audio computer assisted self interview (ACASI) based survey that included questions assessing demographics; relationship characteristics;

contraceptive, pregnancy and STI histories; communication; partner notification and treatment preferences; and partner notification self-efficacy.

Self-efficacy was assessed through a series of six questions in the baseline survey. These questions asked a participant how sure she was that she could carry out certain actions. For instance "How sure are you that you could tell him that you had an STD?" Answers to these questions included very sure, sure, unsure, and very unsure (Appendix A). High self-efficacy was defined as answering all six questions in the affirmative, very sure or sure.

At follow-up participants were administered another ACASI survey (Appendix B). To improve recall of events participants were provided calendars and they were reminded of the initials of their most recent sexual partner from the baseline ACASI survey data. Questions on the follow-up survey determined whether the participant notified her partner, why she decided to tell him or not, what information was relayed in the conversation, and her perception of how her partner reacted. We asked her again about her preferences for partner notification and treatment strategies and we asked her if to her knowledge her partner was treated. All participants that had a positive test for re-infection were treated per clinic and CDC standards [31].

Participants who were unable to return to the clinic for their test for re-infection or for the follow-up survey were offered the opportunity to complete the survey over the phone. If the participant agreed to do the survey over the phone a study staff member obtained verbal consent or assent. The same study staff member then read the survey to the participant and recorded the answers on the tablet computer. Three separate attempts to contact the participant were made before considering her lost to follow-up.

SPSS version 19.0 was used to carry out statistical analysis. Participants' baseline demographic, STI and pregnancy histories and relationship characteristics were summarized with frequencies. The differences between the STI positive and STI negative groups at baseline were determined with a chi-square test of differences. Similar analyses were carried out describe participant preferences for partner notification and treatment strategies at baseline and at follow-up and for high self-efficacy at baseline. Correlates of high self-efficacy and of partner notification were examined by logistic regression. Participants' responses to the follow-up survey questions were summarized with frequencies. The differences between the participants who were enrolled at baseline versus those who were eligible but not enrolled were also determined with a chi-square test of differences.

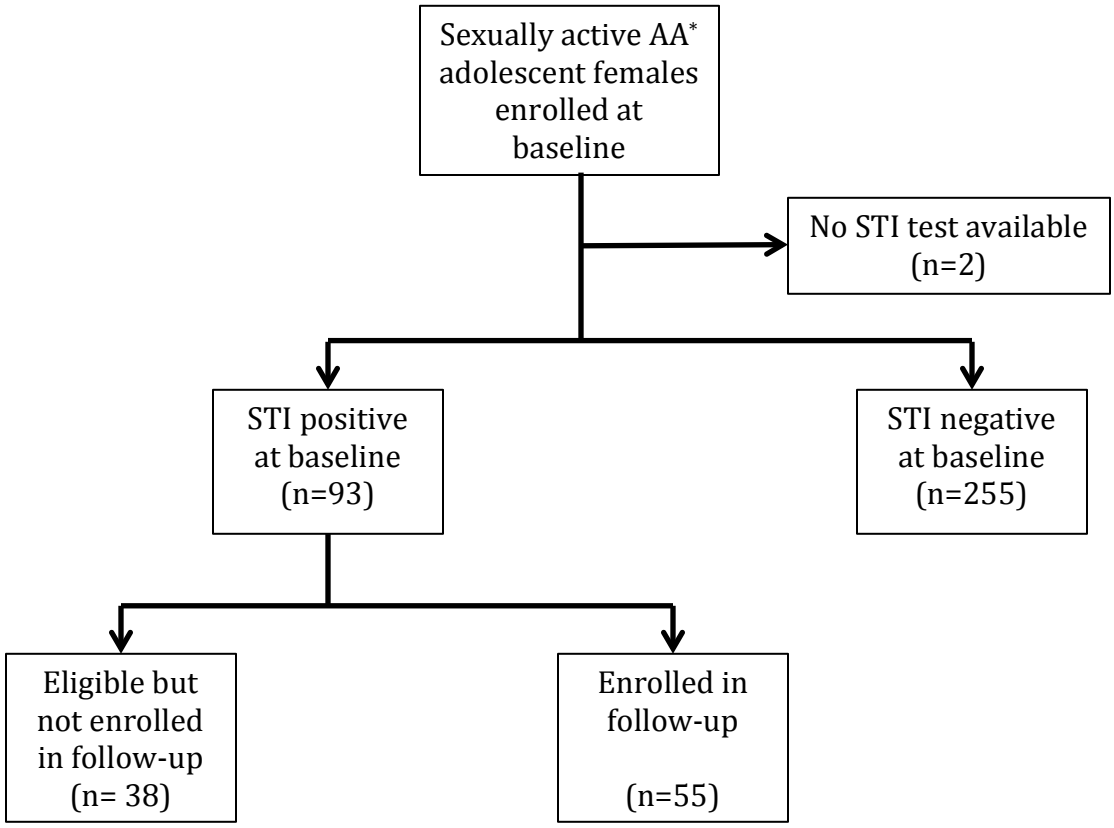
Chapter 4: Results

Baseline

We enrolled 350 participants in the baseline study, of these 348 had STI tests performed, 255 (73.2%) participants tested negative for gonorrhea and or Chlamydia and 93 (26.7%) participants tested positive for gonorrhea and or Chlamydia (Figure 2). Demographic, reproductive history, and behavioral characteristics of all participants were described (Table 2). The majority of participants at baseline were ≥ 17 years old (n=228, 65.1%), were in school (n=323, 92.3%) and had no health insurance (n=264, 75.4%) and approximately half were in a relationship at baseline (n=174, 49.7%) (Table 2).

We compared STI positive participants to those who were STI negative at baseline to determine similarities and differences in these populations. Three characteristics differed significantly between these two groups; health insurance status, history of previously being seen at the Grady Teen Clinic, and whether or not they thought they might have an STI. Participants who tested STI negative at baseline were more likely to have health insurance of any kind ($p = 0.04$), to have been seen previously at the Grady Teen Clinic ($p<0.01$), to not think they might have an STI ($p<0.01$) (Table 2).

Figure 2: Participant Enrollment



*African American

TABLE 2: Baseline demographic, reproductive history and behavioral characteristics, overall and by sexually transmitted infection status at baseline

	Overall (N=350)		STI-negative (N=255)		STI-positive (N=93)		p-value*
	No.	(%)	No.	(%)	No.	(%)	
Age							
<17	122	(34.9)	82	(32.2)	40	(43.0)	<0.06
≥17	228	(65.1)	173	(67.8)	53	(57.0)	
In school							
No	27	(7.7)	20	(7.8)	7	(7.5)	0.92
Yes	323	(92.3)	235	(92.2)	86	(92.5)	
Any job							
No	254	(72.6)	179	(70.2)	73	(78.5)	0.13
Yes	96	(27.4)	76	(29.8)	20	(21.5)	
Has any health insurance							
No	264	(75.4)	186	(72.9)	78	(83.9)	0.04
Yes	86	(24.6)	69	(27.1)	15	(16.1)	
Cigarette use							
No	323	(92.3)	238	(93.3)	83	(89.3)	0.21
Yes	27	(7.7)	17	(6.7)	10	(10.8)	
Alcohol use							
No	276	(78.9)	203	(79.6)	71	(76.3)	0.51
Yes	74	(21.1)	52	(20.4)	22	(23.7)	
Drug use							
No	252	(72.0)	186	(72.9)	65	(69.9)	0.57
Yes	98	(28.0)	69	(27.1)	28	(30.1)	
Ever seen in clinic							
No	119	(34.0)	74	(29.0)	44	(47.3)	<0.01
Yes	231	(66.0)	181	(71.0)	49	(52.7)	
Think might have an STI							
No	255	(72.9)	198	(77.7)	55	(59.1)	<0.01
Yes	95	(27.1)	57	(22.4)	38	(40.9)	
Ever told had an STI							
No	197	(56.3)	149	(58.4)	46	(49.5)	0.14
Yes	153	(43.7)	106	(41.6)	47	(50.5)	

Ever pregnant							
No	258	(73.7)	188	(73.7)	68	(73.1)	0.91
Yes	92	(26.3)	67	(26.3)	25	(26.9)	
Age at first sex							
<15	150	(42.9)	106	(41.6)	44	(47.3)	0.34
≥15	200	(57.1)	149	(58.4)	49	(52.7)	
Lifetime number of sex partners							
≤3	189	(54.0)	140	(54.9)	47	(50.5)	0.47
>3	161	(46.0)	115	(45.1)	46	(49.5)	
In a relationship							
No	174	(49.7)	124	(48.6)	50	(53.8)	0.40
Yes	176	(50.3)	131	(51.4)	43	(46.2)	
Relationship length							
≤6 months	157	(44.9)	112	(43.9)	45	(48.4)	0.46
>6 months	193	(55.1)	143	(56.1)	48	(51.6)	
Type of relationship with most recent sexual partner							
Serious boyfriend	196	(56.0)	150	(58.8)	44	(47.3)	0.06
All others	154	(44.0)	105	(41.2)	49	(52.7)	
Agreed to monogamy							
No	58	(16.7)	41	(16.1)	17	(18.5)	0.61
Yes	290	(83.3)	213	(83.9)	75	(81.5)	

**From chi-squared test of difference by STI status*
STI = sexually transmitted infection

Objective 1 – Describe preferences for partner notification and treatment strategies

All participants at baseline were asked a series of questions about their preferences for partner notification and treatment strategies. We compared the answers to these questions between participants who were STI positive at baseline and those who

were STI negative at baseline to determine if there were any significant differences in preferences between these two populations (Table 3).

Participants were asked their preferred method for notifying their partner of their STI positive diagnosis. The majority would prefer to inform their partner themselves (n=297, 85.1%) versus having a health care provider notify him or not telling him at all (Table 3). There was no significant difference between STI positive and STI negative participants (Table 3). Participants were then posed a series of yes/no questions asking them whether, if provided by the clinic, they would give their partners the following items: a prescription for antibiotics, antibiotic tablets, a referral sheet, an information pamphlet, or an appointment for her partner to be seen in the clinic. In all cases the majority of participants answered yes and there was no statistical difference seen for any of these questions between the STI positive and the STI negative participants (Table 3). When asked to choose their preferred method for partner treatment for a positive STI diagnosis 71.0% (n=247) would prefer to bring their partner with them to clinic. A small minority of participants would prefer to tell him to get tested and treated (n=61, 17.4%) or would prefer to give him medication or a prescription for medication (n=39, 11.1%) (Table 3). There were no significant differences between STI positive and STI negative participants (Table 3).

TABLE 3: Baseline measures of participant preferences overall and by sexually transmitted infection status at baseline

	Overall (N=350)		STI-negative (N=255)		STI-positive (N=93)		p-value*
	No.	**(%)**	**No.**	**(%)**	**No.**	**(%)**	
Measures of preferences							
Preferred method for informing partner of need to be tested and treated for STI							
Participant inform him	297	(85.1)	221	(86.7)	75	(81.5)	0.46
Provider inform him	47	(13.5)	31	(12.2)	15	(16.3)	
Would not want him told	5	(1.4)	3	(1.2)	2	(2.2)	
If given prescription for STI medicine for partner, would give it to him							
No	22	(6.3)	15	(5.9)	7	(7.6)	0.56
Yes	327	(93.7)	240	(94.1)	85	(92.4)	
If given pills for STI treatment for partner, would give it to him							
No	13	(3.7)	9	(3.5)	4	(4.4)	0.72
Yes	336	(96.3)	246	(96.5)	88	(95.7)	
If given referral sheet for partner, would give it to him							
No	12	(3.5)	9	(3.5)	3	(3.3)	0.90
Yes	336	(96.6)	245	(96.5)	89	(96.7)	
Preferred method for partner's treatment for STI							
Accompany him to clinic	247	(71.0)	180	(70.9)	65	(70.7)	0.64
Tell him to get tested/treated	61	(17.4)	47	(18.9)	14	(15.2)	
Give him pills or prescription	39	(11.1)	26	(10.2)	13	(14.1)	
Other	1	(0.3)	1	(0.4)	0	(0.0)	
If participant given pamphlet about her STI, would give it to partner							
No	20	(5.8)	13	(5.1)	7	(7.6)	0.38
Yes	328	(94.3)	241	(94.9)	85	(92.4)	

If given an appointment for partner for testing and treatment at clinic, would tell him							
No	11	(3.2)	8	(3.2)	3	(3.3)	0.96
Yes	337	(96.8)	246	(96.9)	89	(96.7)	

**From chi-squared test of difference by STI status*
STI = sexually transmitted infection

Objective 2 - Identify factors associated with high self-efficacy for partner notification

Participants were asked six questions relating to self-efficacy of partner notification. The answers to these questions were on a four point Likert-type scale ranging from very sure to very unsure. From this scale we defined high self-efficacy for partner notification as answering all questions affirmatively (very sure or sure). The majority of participants answered in the affirmative to the individual questions and 66.3% (n=232) had high self-efficacy for partner notification. The only significant difference between the STI positive and STI negative participants was seen in their answer to whether they were sure they could ask a partner to get treated for an STI (p=0.03). STI negative participants were more likely to answer affirmatively and therefore have high self-efficacy regarding this question (Table 4).

Factors associated with high self-efficacy for partner notification of a positive STI diagnosis at baseline were identified (Table 5). Several characteristics were significantly associated with high self-efficacy for partner notification, these include; older age (OR 1.8, 95%CI 1.2, 2.9), ever having been pregnant (OR 1.9, 95%CI 1.1, 3.2), fewer lifetime sexual partners (OR 2.0, 95%CI 1.3, 3.2), being in a relationship at the time of enrollment (OR 2.0, 95%CI 1.2, 3.3), most recent sexual partner considered a serious boyfriend (OR 1.7, 95%CI 1.1, 2.6), and having ever agreed to monogamy with the most recent sexual

partner (OR 2.1, 95%CI 1.2, 3.7) (Table 5). Being in a relationship was defined as being currently sexually active with the most recent sexual partner and considering him a serious boyfriend.

TABLE 4: Baseline measures of self-efficacy overall and by sexually transmitted infection status at baseline

	Overall (N=350)		STI-negative (N=255)		STI-positive (N=93)		p-value*
	No.	**(%)**	**No.**	**(%)**	**No.**	**(%)**	
Measures of self-efficacy							
Could tell partner that participant has an STI							
Very sure / sure	255	(73.1)	191	(74.9)	63	(68.5)	0.23
Unsure / very unsure	94	(26.9)	64	(25.1)	29	(31.5)	
Could ask partner to get tested for an STI							
Very sure / sure	298	(85.4)	220	(86.3)	76	(82.6)	0.39
Unsure / very unsure	51	(14.6)	35	(13.7)	16	(17.4)	
Could ask partner to get treated for an STI							
Very sure / sure	297	(85.1)	223	(87.5)	72	(78.3)	0.03
Unsure / very unsure	52	(14.9)	32	(12.6)	20	(21.7)	
Could avoid having sex with partner until he was treated for an STI							
Very sure / sure	319	(91.4)	235	(92.2)	82	(89.1)	0.38
Unsure / very unsure	30	(8.6)	20	(7.8)	10	(10.9)	
Could ask partner whether he was tested							
Very sure / sure	323	(92.6)	239	(93.7)	82	(89.1)	0.15
Unsure / very unsure	26	(7.5)	16	(6.3)	10	(10.9)	
Could ask partner whether he was treated							
Very sure / sure	319	(91.4)	237	(92.9)	80	(87.0)	0.08
Unsure / very unsure	30	(8.6)	18	(7.1)	12	(13.0)	
High self-efficacy†							
No	118	(33.7)	80	(31.4)	37	(39.8)	0.14
Yes	232	(66.3)	175	(68.6)	56	(60.2)	

**From chi-squared test of difference by STI status*
†Participants giving positive responses to the preceding six measures of self-efficacy were classified as high self-efficacy
STI = sexually transmitted infection

TABLE 5: Correlates of high self-efficacy at baseline (N=350)

	High self-efficacy		Bivariable analysis	
	No.	**(%)**	**OR**	**(95% CI)**
Age				
<17	70	(57.4)	1.0	
≥17	162	(71.1)	1.8	(1.2, 2.9)
In school				
No	22	(81.5)	2.4	(0.9, 6.4)
Yes	210	(65.0)	1.0	
Ever told had an STI				
No	127	(64.5)	1.0	
Yes	105	(68.6)	1.2	(0.8, 1.9)
Ever pregnant				
No	162	(62.8)	1.0	
Yes	70	(76.1)	1.9	(1.1, 3.2)
Age at first sex				
<15	94	(62.7)	1.0	
≥15	138	(69.0)	1.3	(0.8, 2.1)
Lifetime number of sex partners				
≤3	139	(73.5)	2.0	(1.3, 3.2)
>3	93	(57.8)	1.0	
In a relationship				
No	57	(58.8)	1.0	
Yes	129	(73.3)	2.0	(1.2, 3.3)
Relationship length				
≤6 months	100	(63.7)	1.0	
>6 months	132	(68.4)	1.2	(0.8, 1.9)
Type of relationship with most recent sexual partner				
Serious boyfriend	140	(60.3)	1.7	(1.1, 2.6)
All others	92	(39.7)	1.0	
Agreed to monogamy				
No	30	(51.7)	1.0	
Yes	201	(69.3)	2.1	(1.2, 3.7)

CI = confidence interval; OR = odds ratio; STI = sexually transmitted infection

Follow-Up

Ninety-three participants tested positive for an STI at baseline, and were therefore eligible to enroll for follow-up, of these 55 (59%) were enrolled and 38 (40%) were not enrolled (Figure 2). Baseline demographics, reproductive history and behavioral characteristics were compared between these two groups (Table 6). Three characteristics were found to be significantly different between these two groups. Those who enrolled for follow-up were more likely to be younger at first sex (p=0.01), to have more lifetime sexual partners (p=0.04), and to have ever agreed to monogamy with their sexual partner (p=0.04) (Table 6).

At follow up 42 of the 55 participants enrolled (76.4%) reported that they notified their partners of their STI positive diagnosis. The main reason cited for deciding to tell their partner about the diagnosis was that they wanted him to know that he had infected the participant (n=15, 35.7%) (Table 7). Overall, partners accepted the news well (n=19, 45.2%) and asked participants questions to learn more (n=17, 40.5%) (Table 6). Fewer partners responded to the news in a negative way, 26.2% (n=11) became upset, 23.8% (n=10) accused the participant of having sex with another person, and only one partner responded by threatening the participant with physical abuse (Table 7).

Based on standard clinic counseling and information given to patients who test positive for an STI we asked follow-up participants what information they told their partners. Forty-one (97.6%) told their partners to get tested and treated for the STI, 38 (90.5%) told their partners that they had the potential to re-infect others while a smaller proportion 78.6% (n=33) told their partners that they had the potential to re-infect the participant (Table 7).

The participants enrolled in the follow-up portion of this study were asked again about their preferences for partner notification to identify if there were any differences after testing positive for an STI. Again the majority of participants replied that if provided by the clinic they would give their partners a prescription for antibiotics, antibiotic tablets, a referral sheet, an information pamphlet, and an appointment for their partner to be seen and treated in the clinic (Table 7). When choosing amongst all methods participants at follow-up still preferred to have their partner accompany them to the clinic (n=32, 58.2%), a smaller proportion, 26.3% (n=15) preferred to tell him to get tested and treated. Six (10.9%) participants would choose to give him pills and one (1.8%) would choose to give him a prescription for antibiotics (Table 7).

TABLE 6: Demographic, reproductive history and behavioral characteristics among participants testing positive for sexually transmitted infection at baseline, by enrollment in follow-up study

	Declined to enroll (N=38)		Enrolled (N=55)		
	No.	**(%)**	**No.**	**(%)**	**p-value***
Age					
<17	14	(36.8)	26	(47.3)	0.32
≥17	24	(63.2)	29	(52.7)	
In school					
No	3	(7.9)	4	(7.3)	0.91
Yes	35	(92.1)	51	(92.7)	
Any job					
No	33	(86.8)	40	(72.7)	0.10
Yes	5	(13.2)	15	(27.3)	
Has any health insurance					
No	31	(81.6)	47	(85.5)	0.62
Yes	7	(18.4)	8	(14.6)	
Cigarette use					
No	36	(94.7)	47	(85.5)	0.16
Yes	2	(5.3)	8	(14.6)	
Alcohol use					
No	30	(79.0)	41	(74.6)	0.62
Yes	8	(21.1)	14	(25.5)	
Drug use					
No	28	(73.7)	37	(67.3)	0.51
Yes	10	(26.3)	18	(32.7)	
Ever seen in clinic					
No	21	(55.3)	23	(41.8)	0.20
Yes	17	(44.7)	32	(58.2)	
Think might have an STI					
No	23	(60.5)	32	(58.2)	0.82
Yes	15	(39.5)	23	(41.8)	

Ever told had an STI					
No	18	(47.4)	28	(50.9)	0.74
Yes	20	(52.6)	27	(49.1)	
Ever pregnant					
No	29	(76.3)	39	(70.9)	0.56
Yes	9	(23.7)	16	(29.1)	
Age at first sex					
<15	12	(31.6)	32	(58.2)	0.01
≥15	26	(68.4)	23	(41.8)	
Lifetime number of sex partners					
≤3	24	(63.2)	23	(41.8)	0.04
>3	14	(36.8)	32	(58.2)	
In a relationship					
No	17	(53.1)	17	(37.8)	0.18
Yes	15	(46.9)	28	(62.2)	
Relationship length					
≤6 months	17	(44.7)	28	(50.9)	0.56
>6 months	21	(55.3)	27	(49.1)	
Type of relationship with most recent sexual partner					
Serious boyfriend	15	(39.5)	29	(52.7)	0.21
All others	23	(60.5)	26	(47.3)	
Agreed to monogamy					
No	3	(8.1)	14	(25.5)	0.04
Yes	34	(91.9)	41	(74.6)	

**From chi-squared test of difference by enrollment status in follow-up study*

STI = sexually transmitted infection

TABLE 7: Characteristics among participants participating in follow-up study (N=55)

	No.	(%)
Informed partner of STI diagnosis		
No	13	(23.6)
Yes	42	(76.4)
Among those who did not inform partner, main reason for not informing		
Feared physical abuse	1	(7.7)
Knew he would be very upset	2	(15.4)
Feared he would break up	0	(0.0)
Not dating any more	2	(15.4)
He already knew about the STI	0	(0.0)
Did not know where to find him	1	(7.7)
Think infected by other person	2	(15.4)
Fear he would accuse participant of cheating	0	(0.0)
Other	2	(15.4)
Among those who did inform partner, main reason for informing		
Doctor or nurse instructed to tell	2	(4.8)
Did not want him to spread it to others	11	(26.2)
Did not want him to re-infect participant	10	(23.8)
Wanted him to know that infected participant	15	(35.7)
Wanted him to know that participant could have infected him	3	(7.1)
Other	1	(2.4)
Among those who did inform partner, method of informing partner		
In person	24	(57.1)
Via telephone	13	(31.0)
Via text message	4	(9.5)
Gave referral sheet	1	(2.4)
Clinic staff told him	0	(0.0)
Other	0	(0.0)

Among those who did inform partner, partner's reaction		
Accepted the news well	19	(45.2)
Became upset	11	(26.2)
Accused participant of having sex with another	10	(23.8)
Threatened participant with physical abuse	1	(2.4)
Did not believe participant	5	(11.9)
Responded that already was aware of it	6	(14.3)
Asked participant questions to learn more	17	(40.5)
Among those who did inform partner, details given		
Participant was STI positive	42	(100.0)
Name of STI	37	(88.1)
Name of medicine he should take	17	(40.5)
He needed to be tested	41	(97.6)
He needed treatment	41	(97.6)
Where he should get tested and treated	32	(76.2)
Reason important to be treated	37	(88.1)
Potential to re-infect participant	33	(78.6)
Potential to re-infect others	38	(90.5)
Need to abstain from sex for 7 days after both treated	30	(71.4)
If provided, would give to partner		
Prescription	49	(89.1)
Pills	49	(89.1)
Referral sheet	50	(90.9)
Information pamphlet	48	(87.3)
Appointment in clinic	50	(90.9)
If given choice, preference for notifying and treated partner for an STI		
Accompany him to clinic	32	(58.2)
Tell him to get tested/treated	15	(27.3)
Give him pills	6	(10.9)
Give him prescription	1	(1.8)
Other	1	(1.8)

STI = sexually transmitted infection

Objective 3 - describe the proportion of adolescents at follow-up who are re-infected with an STI

Amongst those enrolled at follow-up there were eleven repeat STI infections identified. Four participants had gonorrhea and seven had Chlamydia, no participant at follow up was co-infected with both gonorrhea and Chlamydia. Nine participants had no STI test available at follow-up because the survey was completed over the phone and they did not return to the clinic to provide a urine sample. The proportion of repeat STI infections at follow-up was 23.9% (Table 8).

TABLE 8: Sexually transmitted infections diagnosed at follow up (N=46*)

	No.	**(%)**
Diagnosis at follow up		
Gonorrhea only	4	(8.7)
Chlamydial infection only	7	(15.2)
Gonorrhea and/or Chlamydia	11	(23.9)

**Nine participants in follow-up study had missing data for diagnosis*

Objective 4 - identify factors associated with whether an infected patient notified her partner of a positive STI diagnosis

We identified baseline factors associated with partner notification of a positive STI diagnosis. Two statistically significant correlates of partner notification were found: A prior history of ever being told of a positive STI diagnosis (OR 19.5, 95%CI 2.3, 164.6) and high self-efficacy for notifying a partner of an STI diagnosis (OR 4.5, 95%CI 1.2, 17.2).

Chapter 5: Discussion

STI infection at baseline and repeat infection at follow-up were high in this African American adolescent female population. It was difficult to determine re-infection at follow-up, defined as re-acquiring the same STI as at baseline from an untreated partner. There were four participants who had discordant infections when comparing baseline to follow-up, they all had Chlamydia at baseline and gonorrhea at follow up. These participants would clearly be defined as having a repeat STI instead of a re-infection. The seven participants that had Chlamydia at baseline and at follow-up could be considered to be re-infected. However, without knowing the treatment status and behavior of the partner there is no way to determine the validity of this. Although high, a 23.9% proportion of repeat STI infection is consistent with what has been previously reported [2, 17]. Adverse reproductive health outcomes like PID and ectopic pregnancy are associated with positive gonorrhea and or Chlamydial infection, and additional infections can lead to worse outcomes [23]. To reduce long-term adverse reproductive health outcomes like infertility we should aim to reduce repeat STI infection and re-infection. This is particularly important among high-risk populations. Two possible ways to do this are improving the likelihood that an adolescent will tell his or her partner of a positive diagnosis and by improving the likelihood that a partner will receive treatment.

When given the choice about how their partner should be notified, tested, and treated for an STI the participants in this study indicated that they would prefer to bring their partners to the clinic with them for a concurrent appointment. ACOG and CDC have endorsed EPT as a practical alternative to traditional partner referral [10, 26] however, it is becoming apparent that this might not be effective for this high-risk population. The

overwhelming majority of participants in this study said they were sure they could and would give their most recent sexual partner medication or a prescription for medication if they were provided these by the clinic. However, when asked to choose between bringing their partner to the clinic versus EPT versus patient referral the majority opted to bring their partner with them to clinic. In keeping with previous studies this indicates that we must think of alternate ways to inform, test, and treat partners of STI positive adolescent females. Our findings suggest that reproductive health clinics tailored to adolescent women should consider offering appointments for their male partners. This may require hiring additional staff or offering additional training to the gynecologists and nurse practitioners that are usually the primary health care providers at these clinics.

High self-efficacy for partner notification of a positive STI diagnosis was associated with several demographic and behavioral characteristics, these included, older age, ever being pregnant, and fewer lifetime sexual partners. There were also several relationship characteristics that were associated with high self-efficacy for partner notification of a positive STI diagnosis: being in a relationship at the time of enrollment, characterizing the most recent sexual partner as a serious boyfriend, and ever having agreed to monogamy their sexual partner were associated with high self-efficacy for partner notification. This infers that being in a more serious relationship and having good communication with a partner, demonstrated by having agreed to monogamy, make it more likely that a participant will be confident in her ability to tell her partner about a positive STI diagnosis. We can use this information to target counseling and interventions at younger adolescent women without serious boyfriends who are less likely to have high self-efficacy for partner notification. Counseling techniques might

include practicing the conversation with a health care provider. Providing a safe place within the clinic to bring their partners and support from health care providers might also improve partner notification.

We also identified correlates of partner notification. Participants who reported telling their partners about their positive STI diagnosis were more likely to have had an STI in the past and to have high self-efficacy for partner notification. Although statistically significant the confidence intervals associated with these findings were quite wide and therefore the actual significance is unclear. This may have been due to our small sample size. However, one could imagine that having confidence in your ability to tell a partner about a positive STI diagnosis and previous experience telling a partner about a positive STI diagnosis would make it easier to do it again.

Limitations

This study had several limitations including loss to follow up; reliance on self reported data, and an inability to generalize beyond the study population. Of the 93 participants eligible for follow-up 55 were successfully enrolled. Of the remaining 38 eligible but not enrolled participants 2 declined to participate. However, we were unable to contact the 36 remaining participants due to changed or disconnected phone numbers. Many of these participants never returned to the Grady Teen Clinic after their initial enrollment visit or after their treatment visit. Because of the large attrition rate between baseline and follow up the proportions of repeat STI diagnoses is not necessarily accurate. If all un-enrolled participants were STI negative our proportion of repeat STI positive participants would be 11.8% versus the unlikely situation that all eligible but not

enrolled participants were STI positive at follow up which would give a proportion of 52.7%.

Another limitation of this study is our reliance on self reported data. As described previously ACASI was used to improve participant's likelihood of answering sensitive questions truthfully and to decrease interviewer bias. However, relying on a participant to inform us whether or not she believes her partner was tested and treated does not give us all the information, for instance there is no way of knowing whether or not her partner was actually tested and treated. To gather this information participants' partners would have to be followed concurrently and surveyed individually.

The final limitation of this study relates to its generalizability. We targeted a population at high risk for incident and recurrent STI infections who are seeking care at a Title X clinic. By doing this, our findings are only generalizable to similar populations; African American adolescent females in the Southern United States who have access to Title X clinics or other similar sliding scale or free reproductive health clinics.

Implications

The implications of this study can be framed within the Social Ecologic Model. Adolescent African American females' behavior surrounding notifying their partner of an STI positive diagnosis has many different levels of influence. This study has demonstrated that on the individual level, partner notification is associated with a participant's age, sexual and reproductive history, and self-efficacy for partner notification. On a relationship level partner notification is associated with being in a relationship, how a participant categorizes her partner, and the ability to communicate about monogamy. These individual and relationship level factors allow health care

providers to identify adolescent women who are less likely to notify their partners of their positive STI diagnosis. By doing so counseling and intervention efforts can be maximized by targeting individuals who need it most. Also adolescent women who are more likely to notify their partners can be supported in their efforts to do so. On a community level partner notification is associated with the clinic in terms of a patient's established care pattern and whether or not her partner can also be seen there. If an STI positive patient has never been seen in the clinic before a closer follow-up schedule might improve the likelihood that she is successful at notifying her partner of the diagnosis. Clinic staff could call the patient the week following her diagnosis to inquire whether or not she notified him and offer support if she has not. And finally, on a societal level partner notification and treatment is influenced by policy and legislation. There has been a large push recently by ACOG and CDC to change policy regarding EPT, to make it more available to everyone. Although in this high risk population it may be beneficial to focus less on the legality of EPT and to increase the number of clinics that will see both males and females and to establish concurrent treatment appointments for adolescent girls to bring their partners with them to clinic.

Areas for Future Research

The findings of this study highlight many areas for future research. First and foremost in order to improve intervention efforts to reduce STI infection, re-infection and repeat infection in this population it is imperative to include adolescent males in future research design. We must remember that sexual health and behavior requires at least two participants. It is not enough to know what the preferences are of the female, we must understand if her preferences align with her partners. If she wants to bring him to the

clinic with her for testing and treatment but he is unwilling to go then this is not a feasible strategy. Future research should focus on adolescent male behavior, knowledge, attitudes, and practices regarding STI diagnosis and treatment. Relying solely on female adolescent's self reported information only gives half of the story.

Conclusions

This study provides important information regarding preferences for partner notification and treatment strategies amongst African American adolescent women both prior to and after a recent STI diagnosis. Our findings may help tailor future counseling and intervention approaches to adolescent women who are less likely to notify their partners of a positive STI diagnosis and therefore are at higher risk for STI re-infection.

References

1. Centers for Disease Control and Prevention, *Sexual and reproductive health of persons aged 10-24 years – United States, 2002-2007. Surveillance Summaries, 2009*. MMWR, 2009. **58**(No. SS-6).
2. Xu, F., et al., *Repeat Chlamydia trachomatis infection in women: analysis through a surveillance case registry in Washington State, 1993-1998*. American journal of epidemiology, 2000. **152**(12): p. 1164-70.
3. Kissinger, P. and M. Hogben, *Expedited partner treatment for sexually transmitted infections: an update*. Current infectious disease reports, 2011. **13**(2): p. 188-95.
4. Centers for Disease Control and Prevention, *Sexually Transmitted Disease Surveillance 2011*. 2012, Atlanta: U.S. Department of Health and Human Services.
5. Fortenberry, J.D., et al., *The role of self-efficacy and relationship quality in partner notification by adolescents with sexually transmitted infections*. Archives of pediatrics & adolescent medicine, 2002. **156**(11): p. 1133-7.
6. Lim, S.W. and S.M. Coupey, *Are adolescent girls with Chlamydia infection notifying their partners?* Journal of pediatric and adolescent gynecology, 2005. **18**(1): p. 33-8.
7. Gursahaney, P.R., et al., *Partner notification of sexually transmitted diseases: practices and preferences*. Sexually transmitted diseases, 2011. **38**(9): p. 821-7.
8. Goldsworthy, R.C. and D.J. Fortenberry, *Patterns and determinants of patient-delivered therapy uptake among healthcare consumers*. Sexually transmitted diseases, 2009. **36**(1): p. 25-32.
9. Shiely, F., M. Horgan, and K. Hayes, *Increased sexually transmitted infection incidence in a low risk population: identifying the risk factors*. European journal of public health, 2010. **20**(2): p. 207-12.
10. Centers for Disease Control and Prevention, *Expedited partner therapy in the management of sexually transmitted diseases*. 2006, Atlanta, GA: US Department of Health and Human Services.
11. Karen Glanz, B.K.R., K. Viswanath, *Health Behavior and Health Education Theory, Research, and Practice*. 4th ed. 2008, San Francisco: Jossey-Bass.
12. B. Rimer, K.G., *Theory at a glance: A guide for health promotion practice*, N.I.o.H. National Cancer Institute, Editor 2005: Washington, DC.
13. Voisin, D.R., et al., *Ecological factors associated with STD risk behaviors among detained female adolescents*. Social work, 2006. **51**(1): p. 71-9.
14. DiClemente, R.J., L.F. Salazar, and R.A. Crosby, *A review of STD/HIV preventive interventions for adolescents: sustaining effects using an ecological approach*. Journal of pediatric psychology, 2007. **32**(8): p. 888-906.
15. *CDC - STD Surveillance, 2011 - Chlamydia*. 2013 [cited 2013 April, 19]; Available from: http://www.cdc.gov/std/stats11/chlamydia.htm.
16. *CDC - STD Surveillance, 2011 - Gonorrhea*. 2013 [cited 2013 April, 19]; Available from: http://www.cdc.gov/std/stats11/gonorrhea/htm.

17. Hosenfeld, C.B., et al., *Repeat infection with Chlamydia and gonorrhea among females: a systematic review of the literature*. Sexually transmitted diseases, 2009. **36**(8): p. 478-89.
18. Niccolai, L.M., et al., *Burden of recurrent Chlamydia trachomatis infections in young women: further uncovering the "hidden epidemic"*. Arch Pediatr Adolesc Med, 2007. **161**(3): p. 246-51.
19. Swartzendruber, A., et al., *Predictors of repeat Chlamydia trachomatis and/or Neisseria gonorrhoeae infections among African-American adolescent women*. Sex Transm Infect, 2013. **89**(1): p. 76-82.
20. Whittington, W.L., et al., *Determinants of persistent and recurrent Chlamydia trachomatis infection in young women: results of a multicenter cohort study*. Sex Transm Dis, 2001. **28**(2): p. 117-23.
21. Batteiger, B.E., et al., *Repeated Chlamydia trachomatis genital infections in adolescent women*. J Infect Dis, 2010. **201**(1): p. 42-51.
22. Burstein, G.R., et al., *Predictors of repeat Chlamydia trachomatis infections diagnosed by DNA amplification testing among inner city females*. Sex Transm Infect, 2001. **77**(1): p. 26-32.
23. Hillis, S.D., et al., *Recurrent chlamydial infections increase the risks of hospitalization for ectopic pregnancy and pelvic inflammatory disease*. Am J Obstet Gynecol, 1997. **176**(1 Pt 1): p. 103-7.
24. Apoola, A., et al., *Patient preferences for partner notification*. Sex Transm Infect, 2006. **82**(4): p. 327-9.
25. Kretzschmar, M., et al., *Effects of screening and partner notification on Chlamydia positivity in the United States: a modeling study*. Sex Transm Dis, 2012. **39**(5): p. 325-31.
26. *Committee opinion no. 506: expedited partner therapy in the management of gonorrhea and chlamydia by obstetrician-gynecologists*. Obstet Gynecol, 2011. **118**(3): p. 761-6.
27. Schillinger, J.A., et al., *Patient-delivered partner treatment with azithromycin to prevent repeated Chlamydia trachomatis infection among women: a randomized, controlled trial*. Sex Transm Dis, 2003. **30**(1): p. 49-56.
28. Golden, M.R., et al., *Effect of expedited treatment of sex partners on recurrent or persistent gonorrhea or chlamydial infection*. N Engl J Med, 2005. **352**(7): p. 676-85.
29. Hogben, M. and G.R. Burstein, *Expedited partner therapy for adolescents diagnosed with gonorrhea or chlamydia: a review and commentary*. Adolesc Med Clin, 2006. **17**(3): p. 687-95; abstract xii.
30. Mercer, C.H., et al., *Estimating the likely public health impact of partner notification for a clinical service: an evidence-based algorithm*. Am J Public Health, 2011. **101**(11): p. 2117-23.
31. Centers for Disease Control and Prevention, *Sexually Transmitted Diseases Treatment Guidelines, 2010*. MMWR, 2010. **59**(No. RR-12).

Appendix A: Baseline Survey

Imagine that you found out today that you had an STD. When one partner has an STD, the other partner should get tested and treated. There are different ways to let partners know what they need to do *For this next set of question, think about how you would tell <initials> that he should get tested and treated.*	
How sure are you that you could tell <initials> that you had an STD?	[___] Very sure [___] Sure [___] Not sure [___] Very unsure
How sure are you that you could ask <initials> to get tested for an STD?	[___] Very sure [___] Sure [___] Not sure [___] Very unsure
How sure are you that you could ask <initials> to get treated for an STD?	[___] Very Sure [___] Sure [___] Not Sure [___] Very unsure
How sure are you that you could avoid having sex with <initials> until he was also treated for an STD?	[___] Very sure [___] Sure [___] Not sure [___] Very unsure
How sure are you that you could ask <initials> if he got tested?	[___] Very sure [___] Sure [___] Not sure [___] Very unsure
How sure are you that you could ask <h08 > if he got treated?	[___] Very sure [___] Sure [___] Not sure [___] Very unsure
Do you think <initials> would tell you if he had an STD?	[___] No [___] Yes [___] I don't know

If you were given the choice how would you want <initials> to be told that he should get tested and treated for the STD?	[___] Tell him myself [___] Have a provider (doctor, nurse, health educator) tell him [___] I wouldn't want him to be told
The next set of questions ask about what you would do if you had an STD and <initials> needed to get treatment for the STD.	
If you were given a prescription (a piece of paper) for <initials> for medicine to treat an STD, would you give it to him?	[___] No [___] Yes
If you were given pills for <initials> to treat an STD, would you give them to him?	[___] No [___] Yes
If you were given a referral sheet for <initials> (telling him where he can go for testing or treatment), would you give it to him?	[___] No [___] Yes
If you were given a choice, how would you want <initials> to get treatment for an STD?	[___] Bring him with you to the clinic to get treated [___] Tell him to get tested/treated [___] Give him pills Give him a prescription for pills Other
If you were given a pamphlet with information about the STD you have would you give it to <initials>?	[___] No [___] Yes
If you were given an appointment for <initials> to be seen in this clinic for testing and treatment would you tell him about it?	[___] No [___] Yes
The following questions are about how your health and <initials>'s health are related to each other. Pick whether you strongly agree, agree, disagree, or strongly disagree with each statement.	
I think it is important for <initials> to know if I get an STD.	[___] Strongly agree [___] Agree [___] Disagree [___] Strongly disagree

I believe <initials> sexual health has an effect on my own health.	[___] Strongly agree [___] Agree [___] Disagree [___] Strongly disagree
I believe my sexual health has an effect on <initials> health.	[___] Strongly agree [___] Agree [___] Disagree [___] Strongly disagree
I think it is my responsibility to tell <initials> about my STD results.	[___] Strongly agree [___] Agree [___] Disagree [___] Strongly disagree

Appendix B: STI Positive Follow-up Survey

We'd like to start by talking about the guy you most recently had sex with when you took the last survey. Please look at the tablet screen for the initials or nickname you gave us: <initials>. We'd like to ask you a few questions about conversations you may have had with your partner about your positive STD test	
Which STD(s) did you have?	[___] Gonorrhea [___] Chlamydia [___] Both Gonorrhea and Chlamydia [___] I don't know
Were you given medicine to treat your STD?	[___] No [___] Yes [___] I don't know
After you were told that you had an STD, did you tell <initials> that you had an STD?	[___] No [___] Yes
If you didn't tell <initials> about your STD is it because <initials> had already told you that he had an STD?	[___] No [___] Yes
What was the main reason why you didn't tell <initials> about your positive STD test?	[___] I was afraid that he would hurt me physically (beat me up) [___] I knew he would be very upset [___] I was afraid he would break up with me [___] I am not dating him anymore [___] He already knew about the STD [___] I didn't know where to find <initials> [___] I think someone else gave me the STD [___] I was afraid he'd accuse me of cheating. [___] Other (specify)
Please tell us why you didn't tell <initials> about your positive STD test	

What was the main reason you decided to tell <initials> about your positive STD test?	[___] My doctor/nurse said I should tell him [___] I didn't want him to spread the infection to others [___] I didn't want him to give the infection back to me [___] I wanted to let him know that he gave me the infection [___] I wanted him to know that I could have given him an infection [___] Other (specify)
Please tell us what made you decide to tell <initials> about your positive STD test.	
How did you tell <initials> about your positive STD test?	[___] I told him in person [___] I told him over the phone [___] I sent him a text message [___] I gave him the referral sheet (a piece of paper with the names of places he could get tested and treated) [___] A doctor, nurse, or someone else from the clinic told him for me [___] Other (specify)
Please tell us how you told <initials> about your positive STD test.	
How did <initials> respond when you talked to him about your positive STD test? Pick all that apply	[___] He accepted the news well [___] He got upset [___] He accused me of having sex with someone else [___] He threatened to hurt me physically (beat me up) [___] He did not believe me [___] He told me he already knew about it [___] He asked me questions, so he could learn more about STDs

Did <initials> respond in another way when you talked to him about your positive STD test that wasn't listed in the previous question? If yes please tell us about it here otherwise please type "no".	
I told <initials> that I had an STD	[___] No [___] Yes
I told <initials> the name of the STD that I had	[___] No [___] Yes
I told <initials> the name of the medicine(s) he needed to take	[___] No [___] Yes
I told <initials>that he needed to get tested for STDs	[___] No [___] Yes
I told <initials> that he needed to get treated for the STD	[___] No [___] Yes
I told <initials> where he could get tested and treated	[___] No [___] Yes
I told <initials> why it was important for him to get treated	[___] No [___] Yes
I told <initials> if he didn't get treated he could give the infection back to me	[___] No [___] Yes
I told <initials> if he didn't get treated he could give the infection to someone else	[___] No [___] Yes
I told <initials> that we couldn't have sex for at least 7 days after we were both treated	[___] No [___] Yes
Next we'd like you to think about what you might have done if you'd had the following options	

If you had been given a prescription (a piece of paper) for medicine to give to <initials> to treat the STD, would you have given it to him?	[___] No [___] Yes
If you had been given pills to give to <initials> to treat the STD, would you have given them to him?	[___] No [___] Yes
If you were had been given a referral sheet for <initials> (telling him the name of the STD and where he could go for testing or treatment), would you have given it to him?	[___] No [___] Yes
If you had been given a pamphlet with information about the STD you had would you have given it to <initials>	[___] No [___] Yes
If you had been given an appointment for <initials> to be seen in this clinic for testing and treatment would you have given it to him?	[___] No [___] Yes
If you had been given the choice, how would you have wanted <initials> to be notified about and treated for an STD?	[___] Bring him with you to clinic to get treated [___] Tell him to get tested/treated [___] Give him pills [___] Give him a prescription for pills [___] Other
Please tell us how you would have wanted <initials> to have been notified and treated for the STD.	
Next we'd like to ask you some questions about your relationship(s)	
Do you think <initials> gave you the STD?	[___] No [___] Yes

Are you still dating (seeing) <initials>?	[___] No [___] Yes
Have you had sex with <initials> since you found out you had an STD?	[___] No [___] Yes
Did you wait until at least 7 days after you were both treated to have sex?	[___] No [___] Yes
Have you used condoms with <initials> at all, since you found out you had an STD?	[___] No [___] Yes
How often have you used condoms with <initials> since you found out you had an STD?	[___] Never [___] Less than half the time [___] About half the time [___] More than half the time but not always [___] Always
Have you had sex with anyone else other than <initials> since your positive STD test	[___] No [___] Yes
How often do you use condoms with the guy you had sex with who is not <initials>?	[___] Never [___] Less than half the time [___] About half the time [___] More than half the time but not always [___] Always
We'd like to know if <initials> got tested and treated after you told him about your positive STD test. Please answer the following questions as best as you can based on the information you know.	
Did <initials> go to a clinic?	[___] No [___] Yes [___] I don't know
Did <initials> get tested for STDs?	[___] No [___] Yes [___] I don't know

Did <initials> get medicine to treat the STD?	[___] No [___] Yes [___] I don't know
Did <initials> have any problems getting an appointment at a clinic to get tested and treated?	[___] No [___] Yes [___] I don't know
Please tell us what problems <initials> had getting an appointment at a clinic.	
Did <initials> have any problems getting to a clinic? In other words did he have any problems with transportation (car, bus, etc.)?	[___] No [___] Yes [___] I don't know
Please tell us what problems <initials> had with getting to the clinic	
Did <initials> have any problems paying for the appointment or the treatment?	[___] No [___] Yes [___] I don't know
Please tell us what problems <initials> had paying for the appointment	
Did <initials> have any other problems getting tested and treated for the STD as far as you know? (If <initials> had no problems please type "no" in the box).	