

ORIGINAL ARTICLE

Adolescent women underestimate their susceptibility to sexually transmitted infections

K A Ethier, T Kershaw, L Niccolai, J B Lewis, J R Ickovics

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See end of article for authors' affiliations

Correspondence to:
Kathleen A Ethier, Ph.D.,
Centers for Disease
Control and Prevention,
National Center for HIV,
STD and TB Prevention,
Division of STD Prevention,
1600 Clifton Road, NE,
MS-E44, Atlanta, GA
30329, USA; kbe0@cdc.
gov

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Objectives: Adolescent females are at significant risk for sexually transmitted infections (STI) and may not accurately incorporate indicators of risk into their perceptions of susceptibility. The objectives of the current analyses were to: (1) examine the relation between perceived susceptibility and indicators of risk; and (2) investigate the relation between perceived susceptibility and actual STI diagnosis.

Methods: Participants were 209 sexually active adolescent females. Indicators of STI risk included STI history, recent symptoms, and sexual risk behaviour (that is, recent unprotected sex and numbers of sexual partners). Chlamydia and gonorrhoea infection were assessed at baseline, 6, and 12 months post-baseline using urine based ligase chain reaction testing.

Results: Most participants perceived little or no chance that they would be diagnosed with an STI in the following year. There was no relation between almost all STI indicators and perceptions of susceptibility. Among those receiving a positive chlamydia or gonorrhoea test ($n=49$) at baseline or in the year following, almost all (81.3%) had perceived themselves to be at little or no risk.

Conclusion: The adolescent females in this sample did not accurately perceive their susceptibility to STI. They must be enabled to more effectively assess and modify their risk.

Perceived susceptibility to adverse health outcomes is a major factor in theoretical models of behaviour change.^{1–2} Accurately assessing personal risk and making the connection between behaviour and susceptibility to infection are important first steps in preventing disease.

Inaccurate perceptions of susceptibility may be a significant barrier to preventing sexually transmitted infection (STI) and, ultimately, human immunodeficiency virus (HIV) infection. In order to perceive themselves as susceptible, adolescents should be able to recognise a number of factors as indicators of risk for STI. For instance, unprotected intercourse and multiple sexual partners, the focus of most prevention programmes,³ are significant sources of STI risk. Although STIs are often asymptomatic, symptom recognition is an important aspect of diagnosis, treatment, and prevention. Finally, STI history is a strong predictor of future STI diagnosis and, in terms of adolescents' cognitive associations, previous experience with an STI could increase awareness of behaviours and symptoms that indicate STI risk. If adolescents appropriately understand the factors that put them at risk for STI, they should recognise that these indicators make them more susceptible to STI. Further, accurate perceptions of susceptibility of STI should be related to actual infection.

Although several studies have linked adolescents' perceived HIV susceptibility and sexual risk behaviour,^{4–7} few studies have investigated susceptibility to other STIs. Ellen and colleagues examined adolescents' perceived risk for STIs and HIV infection and found that perceptions of lower relative risk for STIs and for HIV were not predicted by past condom use or number of lifetime partners.⁸ Although a previous study of worries about STIs has shown an association with a history of previous STIs, the relation between previous STI and future predictions of diagnosis has not been examined. Further, no research has examined whether adolescents' perceptions are accurate—that is, the association between perceived susceptibility and actual sexually transmitted infection.

The objectives of the current analyses were to examine: (1) whether indicators of STI risk inform perceptions of

susceptibility, and (2) the relation between perceived susceptibility and subsequent infection with chlamydia and gonorrhoea.

METHODS

Study sample

Participants were adolescent females taking part in a larger prospective study on HIV/STI risk behaviour among pregnant and sexually active teenagers. Participants were recruited through 10 hospital clinics, community healthcare centres, and high school based clinics in New Haven, Bridgeport, and Hartford, Connecticut. These three cities have the highest rates of teenage pregnancy, HIV/AIDS, and STI in Connecticut.^{9–10} Between June 1998 and March 2000, eligible women were approached at clinics, referred by an enrolled participant, or contacted study staff after viewing advertising material. Eligibility included being female, between the ages of 14 and 19 years of age, being pregnant, or ever having had sexual intercourse with a male partner and being nulliparous.

Of the 910 adolescent females initially screened for inclusion in the study, 305 did not meet eligibility criteria and 65 could not be contacted after the initial screening. Of the remaining 540 eligible adolescent females, 412 agreed to participate and were interviewed (response rate 76%). The current analyses utilised data for the non-pregnant participants ($n=209$), who came from the same clinics as the pregnant participants. The average age of the participants included in these analyses was 16.7 years of age and their mean monthly family income was \$539. They were primarily African-American ($n=92$, 44.0%) and Latina ($n=81$, 38.8%).

Procedures

Participants completed a 90 minute face to face interview and provided urine for ligase chain reaction testing for chlamydia and gonorrhoea every 6 months for a total of 18 months. Participants with a positive test result were contacted and referred to their clinic for treatment. Data from the baseline interview and STI test results for the baseline through 12

month interviews were used in these analyses. Of the 209 non-pregnant participants who completed a baseline interview, 207 have at least one STI test. A total of 135 participants (64.6%) had an STI test at all three time points, 50 participants (23.9%) had an STI test at two time points, and 24 participants (11.5%) had one STI test. Four participants were missing an STI test at baseline, 55 participants missed an STI test at 6 months, and 40 participants missed an STI test at 12 months.

Participation was voluntary, confidential and did not influence the provision of health care in any way. All procedures were approved by the Yale University Human Investigation Committee and by institutional review boards at study clinics. Women were paid \$25 for each interview completed.

Measures

The measures used for the current analyses were gathered as part of a larger 90 minute interview that assessed risk behaviour for STIs and teen pregnancy as well as a variety of psychosocial predictors of risk behaviour. In addition to the measures presented here, we administered several mental health scales (for example, distress, and self esteem), questions about contraceptive use, knowledge and attitude, and peer and relationship factors.

Perceived susceptibility

Participants rated the likelihood that they would get an STI in the next year on a scale of 0 (no chance) to 3 (a very good chance). Ratings were dichotomised; categories of "no chance" and "little chance" were combined as were categories of "some chance" and "a very good chance." This dichotomisation was chosen because (1) an expression of "little chance" of being diagnosed with an STI indicates a perception of substantially less susceptibility than "some chance" or "a very good chance," and (2) we were interested in whether participants underestimated their susceptibility to STI in relation to STI indicators; the response of "little chance" represents such an underestimation.

STI history

Participants were categorised as having a previous STI if they reported a diagnosis with chlamydia, gonorrhoea, trichomonas, genital herpes (herpes simplex virus), genital warts/human papillomavirus (HPV), or syphilis.

Unprotected sex

Participants were categorised as having unprotected sex in the previous month if their reported intercourse occasions and reported condom use indicated less than 100% use.

Lifetime sexual partners

Participants were categorised as having ≥ 4 or < 4 partners based on reported lifetime sexual partners. (This cut off is a standard indication of high numbers of partners.²)

STI symptoms

Participants were categorised as having experienced STI symptoms if they reported discharge, sores, bumps, rash, swelling or other lesions, or pain or discomfort with urination in the past month.

STI infection

Participants were categorised as having an STI if their baseline, 6 month, or 12 month urine sample tested positive for chlamydia or gonorrhoea. (Baseline STI testing was included because the participants did not know the results of the test when questions regarding susceptibility to STI were answered.)

Data analytic strategies

All data were analysed using the Statistical Package for Social Sciences. Logistic regression was used to examine the relation between STI indicators and perceived susceptibility, and the four predictor variables were entered as a block. Odds ratios and 95% confidence intervals are reported. Logistic regression was also used to assess the relation between perceived susceptibility and a positive chlamydia or gonorrhoea test.

RESULTS

Detailed information on previous STI, symptoms, and risk behaviour is presented in table 1. This sample of adolescent women was at high risk for STI. Fifty nine participants (28.6%) had a past STI and a significant portion of those participants had multiple diagnoses. The young women in this sample began having sex at young ages. The mean age at sexual initiation was 14.5 years, with a range of 10–18 years and a standard deviation of 1.5. Almost half of the participants had unprotected sex in the previous month.

Data on the relation between perceived susceptibility and STI indicators appear in table 2. Most participants (88.9%) perceived little or no risk for STI and only 11.2% perceived a higher risk of getting an STI. In contrast, 73.8% of the sample reported a previous STI, risky sexual behaviour, or symptoms.

There was no significant relation between perceived susceptibility and the experience of recent symptoms, unprotected sex or higher numbers of sexual partners. Only 17.6% of symptomatic participants, 13.0% of those who had unprotected sex and 15.9% of those with more than four lifetime sexual partners perceived that they had a significant chance of getting an STI. There was a significant relation between STI history and perceived susceptibility; however, only 20.3% of those with a previous STI perceived that there was some or a very good chance of getting an STI.

Forty eight (23.2%) participants tested positive for chlamydia ($n = 38$), gonorrhoea ($n = 5$) or both ($n = 6$) at baseline, 6, or 12 months. There was no statistically significant relation between perceived susceptibility and testing positive for either chlamydia or gonorrhoea. (OR (2.39, 95% CI = 0.96 to 5.93)). Of those who tested positive, 81.3% believed there was little or no chance that they would get an STI during that time.

Table 1 STD risk indicators

	No (%)
STI history	
Chlamydia	48 (22.9)
Gonorrhoea	12 (5.7)
HSV	3 (1.4)
HPV	5 (2.4)
Trichomonas	12 (5.7)
Syphilis	1 (0.5)
Time since last STI diagnosis*†	
≤ 1 year	41 (69.5)
> 1 year	17 (28.8)
Multiple (> 1) STI diagnoses*	25 (42.4)
Recent symptom types	
New or unusual discharge	26 (12.4)
Sores, bumps, rash, or lesions	19 (9.1)
Painful urination	25 (12.0)
Age at sexual initiation (mean, years)	14.5
Sexual activity in past month	
No intercourse	49 (23.4)
Only condom protected intercourse	58 (27.8)
Unprotected intercourse	102 (48.8)

*Among participants with a previous STI diagnosis ($n = 59$).

†Missing data.

Table 2 Perceived susceptibility to STI and STI indicators

		Little or no chance	Some/a very good chance	OR (95% CI), p level
		No (%)	No (%)	
STI history (n = 206)	Yes	47 (79.7%)	12 (20.3%)	2.61 (1.04 to 6.55), 0.04
	No	136 (92.5%)	11 (7.5%)	
Symptoms (n = 206)	Yes	42 (82.4%)	9 (17.6%)	1.71 (.67 to 4.40), 0.27
	No	141 (91.0%)	14 (9.0%)	
Unprotected sex (n = 207)	Yes	87 (87.0%)	13 (13.0%)	1.15 (.45 to 2.90), 0.78
	No	97 (90.7%)	10 (9.3%)	
Lifetime sexual partners (n = 207)	≥4	69 (84.1%)	13 (15.9%)	1.52 (.58 to 3.96), 0.40
	<4	115 (92.0%)	10 (8.0%)	
Total		184 (88.9%)	23 (11.1%)	

DISCUSSION

The adolescent females in this sample clearly underestimated their susceptibility to STI. They are at high risk; almost one third reported a previous diagnosis, and almost a quarter was diagnosed with an STI during the study period. In contrast, only 11% believed that there was at least some chance of getting an STI. Although those with a previous STI were more likely to perceive that they were at risk, there was no significant relation between three obvious risk indicators (that is, symptoms, unprotected sex, and high numbers of sex partners) and perceptions of susceptibility. Although, as some previous research suggests,⁵ there was a significant positive relation between a previous STI diagnosis and perceived susceptibility, the majority of those who had had an STI in the past believed there was little or no chance they would be diagnosed in the coming year. Most importantly, most of those who tested STI positive in the following year predicted that there was little or no chance of that occurrence.

The patterns in these data (that is, high rates of STI risk, low levels of perceived susceptibility, and high rates of subsequent infection) indicate a mismatch between evidence and perceptions of risk. Other research suggests a similar lack of an association between perceived risk for STI and HIV and factors expected to be important in judgments of risk (for example, condom use, number of partners, STI/HIV beliefs).⁸ Adolescents may not be fully aware that unprotected sex puts them at risk for STIs other than HIV. They may also not recognise the symptoms that indicate STI infection. Although developmental theory would suggest that these findings are a result of adolescent egocentrism and resulting “personal fables,”¹¹ research suggests that the lack of an association between perceived susceptibility and disease outcomes are part of a more general tendency towards optimistic biases and are not primarily a problem among adolescents, per se.¹² Regardless, these findings are disturbing, especially given that this high risk sample is receiving reproductive health care and ongoing interaction with healthcare professionals.

The limitations of this study, including the small sample size and the single item nature of the perceived susceptibility variable, and the homogeneity of our sample, warrant caution. In addition, our data regarding STI indicators are self reported, which often generates concern or caution regarding the validity of the responses. However, in this study we are interested primarily in the perceptions of our participants. We would not expect a relation between symptoms or STI history and perceived susceptibility if the participant did not recognise that she was experiencing symptoms or remember that she was previously diagnosed with an STI. In these analyses, it is actually important that the STI indicators come from participants’ reports for exactly that reason; in order to affect perceived susceptibility they should be remembered and acknowledged by the

Key messages

- Adolescent females at high risk for STI do not accurately incorporate indicators of risk into their perceptions of susceptibility for disease outcomes. There was no relation between indicators of STI susceptibility, including the experience of symptoms, having had unprotected sex and multiple partners, and perceived susceptibility
- Among adolescent females diagnosed with either chlamydia or gonorrhoea over a 1 year period, almost all (81.3%) had perceived themselves to be at little or no risk at baseline

participants. The fact that these indicators, even when presented by participants, had so little influence on perceptions of susceptibility make the results even more compelling.

Thus, despite possible limitations and concerns, our results are noteworthy. Our sample adolescent girls are primarily poor and African-American and Latina, groups at very high risk for STI infection. A prospective examination of predictions of STI and actual diagnosis has not been previously reported. STI prevalence juxtaposed to perceptions of risk is significant. Given the high rates in this population, more work is necessary to help young women to accurately assess their risk for infection. Adolescent females must have the knowledge and skills to recognise their susceptibility to STI infection as a first step toward disease prevention.

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CONTRIBUTORS

KE contributed to the study’s design, served as co-investigator and initial project director, conducted the data analysis and interpretation, and wrote and revised the article; TK and LN contributed to the management of the data and the interpretation and revision of the article; JL supervised data collection and management, and the interpretation and revision of the article; JI contributed to the study’s design, served as principal investigator, and contributed to the interpretation and revision of the article.

Authors’ affiliations

K A Ethier, Centers for Disease Control and Prevention, National Center for HIV, STD, and TB Prevention, Division of STD Prevention, 1600 Clifton Road, Atlanta, GA, USA

T Kershaw, L Niccolai, J B Lewis, J R Ickovics, Yale University School of Medicine, Department of Epidemiology and Public Health, New Haven, CT, USA

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