Racial/Ethnic Differences in Patterns of Sexual Risk Behavior and Rates of Sexually Transmitted Infections Among Female Young Adults

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Objectives. We examined patterns of sexual behavior and risk for sexually transmitted infections (STIs) in young adulthood for Black, Hispanic, and White females.

Methods. We used a nationally representative sample of 7015 female young adults from wave III of the National Longitudinal Study of Adolescent Health. Sexual risk items assessed behaviors occurring in the previous 6 years and past year to determine classes of sexual risk and links to STIs in young adulthood.

Results. Latent class analysis revealed 3 sexual risk classes for Black and Hispanic youths and 4 sexual risk classes for White youths. The moderate and high risk classes had the highest probabilities of risky sexual partners, inconsistent condom use, and early age of sexual initiation, which significantly increased odds for STIs compared with recent abstainers.

Conclusions. We found different classes of sexual behavior by race/ethnicity, with Black and Hispanic young women most at risk for STIs in young adulthood. Preventive efforts should target younger adolescents and focus on sexual partner behavior. (*Am J Public Health.* 2013;103:903–909. doi:10.2105/AJPH.2012.301005)

Sexually transmitted infections (STIs) are on the rise among young adults in the United States, with chlamydia and gonorrhea reported as the most common curable infectious diseases. According to the Centers for Disease Control and Prevention,[1] close to one quarter of adolescent and young adult females are diagnosed with an STI each year, and nearly half of newly reported cases are found in Black females aged 15 to 24 years. In fact, Black females are 8.7 times more likely to contract chlamydia and 20.5 times more likely to contract gonorrhea than are White females. The rate of STIs in the Hispanic population is also high, with Hispanics twice as likely to acquire chlamydia and gonorrhea as Whites. To better understand the disproportional rates of STIs within diverse racial/ethnic groups, we used a person-centered approach to elucidate unique patterns of individual and partner sexual risk behaviors in adolescence and young adulthood and links to risk for chlamydia, gonorrhea, and trichomoniasis in Black, Hispanic, and White youths. A person-centered approach, which has rarely been used in STI research, allowed us to examine how unique patterns of sexual risk behaviors within racial/ethnic groups differentially relate to risk for STIs and provided us with a more nuanced understanding of areas on which to focus preventive efforts.

Research has demonstrated that rates of risky sexual behavior increase in adolescence and peak in early adulthood.[2] Risky sexual behavior in adolescence is commonly characterized in the literature by early age of sexual initiation (i.e., vaginal intercourse before age 15 years) and greater number of sexual partners.[3,4] Engaging in sexual activity at a young age increases the likelihood of multiple sexual partners and exposure to older, riskier partners.[5] In fact, longitudinal research has directly linked early sexual onset and involvement with multiple partners to increased risk for STIs. Using survey data and biological tests for STIs, researchers found that adolescent girls who were younger at time of first intercourse were more likely to enter into a new sexual relationship during the study, and acquisition of a new sexual partner significantly increased risk for STIs.[6] These findings point to early sexual debut and engaging in sex with multiple partners as strong predictors of increased risk for STIs. In this study, we examined age of onset for vaginal intercourse as well as accumulation of vaginal, oral, and anal sex partners over a 6-year timeframe.

A unique contribution of this study is its inclusion of a range of sexual activity, including vaginal, oral, and anal sex, as markers of risky sexual behavior. Research has found that oral and anal sex may lead to engagement in riskier sexual practices and, therefore, increase risk for STIs.[7] Racial/ethnic differences have been substantiated in rates of oral and anal sex, with some studies finding that Black females were more likely to engage in vaginal sex only, whereas White youths were more likely to engage in vaginal, oral, and anal sex.[8] Few studies have examined varied types of sexual activity in addition to partners' sexual risk behaviors, particularly using a person-centered approach. Thus, we add to the literature by exploring both individual and partner behaviors within racial/ethnic groups and associated risk for STIs on the basis of unique patterns of sexual behavior.

Lack of contraception use is another well-substantiated marker of risky sexual behavior. Although condoms are highly effective in protecting against most STIs, gender and racial/ethnic differences exist in the frequency and initiation of use. Research has found that females report lower initiation of condom use than males and often have less decision-making power regarding the use of condoms, increasing risk for STI exposure.[9–11] This power differential in condom use is especially present in Hispanic culture, whereby males are less likely to use condoms and females are expected to defer to their partner's decisions about contraception use.[12] In addition, condoms are

not effective protection against STIs if they are used inconsistently, which is often the case among adolescents and young adults.[13] Whereas many researchers have inquired about condom use during most recent vaginal intercourse,[4] we attempted to gain a broader picture of condom use by asking about overall frequency of use with sexual partners in the past year.

Engaging in sex with concurrent partners and short duration between sexual partners also influence risk for STIs. Youths who are in single-partner or monogamous sexual relationships may reduce or eliminate condom use, often on the basis of trust of partner's monogamy and perceived low risk for exposure to STIs.[12] Although youths in monogamous relationships may perceive less risk for STIs, one cannot be certain of a partner's behaviors, which puts oneself at risk. Moreover, having concurrent partners or partners who overlap between sexual relationships has been associated with the rapid spread of STIs and HIV.[14] Shorter time intervals between sexual partners decrease the likelihood of STI testing and the manifestation of STI symptoms. Two of the STIs under investigation in this study, chlamydia and gonorrhea, often present with no symptoms in females, which may partially explain the rapid spread of these particular strains. A strength of this study is that we examined both self-reports of STIs in the past year as well as the use of biological markers of STIs to gain a more comprehensive and accurate estimate of STI rates in a national sample of youths from various racial/ethnic backgrounds.

Considering sexual networks as a risk context for the spread of STIs is also important. In Black communities in particular, the network of sexual partners is often limited by the smaller ratio of men to women.[15] As the pool of available sexual partners becomes more restricted, sexual networks are much denser and individuals are more closely connected to one another, increasing risk for STI exposure.[16] Thus, one would expect the spread of STIs to be more rapid, which supports the alarming statistics indicating high rates of STIs among Black females. In this study, we included self-reported indicators of partner risk behavior, such as partners' concurrent sexual activity in the past 6 years as well as partners' lifetime STI history.

Overall, we added to the existing research by using latent class analysis (LCA) to examine patterns of sexual risk behavior over an extended period beginning in adolescence and continuing into young adulthood within different racial/ethnic groups, aiming to link sexual risk patterns over time to risk for STIs. Only 2 known studies have identified distinct patterns of sexual behaviors among adolescent populations using LCA.[17,18] These studies found evidence for 4 distinct groups—abstainers, with no history of sexual activity; those with a monogamous pattern of limited sexual activity primarily with 1 partner; those with a low risk pattern with few sexual partners; and those with a high risk pattern with multiple sexual partners and early age of sexual initiation. However, neither of these studies looked within distinct racial/ethnic groups using a large, nationally representative sample or used the risk indicators in our study, including varied types of sexual activity over a 6-year time span.

On the basis of the limited research that has used LCA, we hypothesized similar abstainer, monogamous, and risky patterns of sexual behavior within racial/ethnic groups. We also expected engagement in more risky sexual patterns to be related to increased risk for STIs, with White females engaged in a wider variety of individual sexual risk behaviors (e.g., more partners, varied sexual activity) and Black females having the highest prevalence of partner risk behaviors, resulting in higher rates of STIs. Although less research has examined Hispanic females' sexual risk behaviors using a person-centered approach, we expected to find groups that exhibited monogamous patterns and lower condom use, which would increase risk for STIs.

METHODS

We used data from the National Longitudinal Study of Adolescent Health (Add Health). Add Health is a large, school-based survey of adolescents' health-related behaviors and contextual influences on behaviors.[19] We used wave III in-home interview data, which were collected in 2001–2002. In the original first wave of data collection, an accelerated cohort design was used, whereby youths in successive grade cohorts (grades 7–12 during the 1994–1995 school year) were surveyed longitudinally during overlapping temporal periods. The design involved a nationwide sample of 132 middle and high schools selected to participate in the study; sampling and stratification methods ensured the sample was representative of schools in the United States with respect to region of country, urbanicity, school size and type, and racial/ethnic distribution. A detailed description of the Add Health study can be found elsewhere.[19]

The total sample for wave III was composed of 14 322 male and female participants. The sample for this study included only females (n = 7015) with sampling weights to represent the national population with respect to race/ethnicity (mean age = 21.9 years; SD = 1.76; range = 18–27). The racial/ethnic composition of the sample, as indicated by self-report, was 4118 (58.7%) identifying as non-Hispanic White, 1716 (24.5%) identifying as African American, and 1181 (16.8%) identifying as Hispanic. Education was dichotomized into high school graduate–general equivalency diploma (GED) completion or noncompletion of high school; 92.1% of the sample completed high school or received a GED. All participants also indicated a heterosexual sexual orientation.

Measures

Sexual risk behaviors. We used 8 items to reflect sexual risk behaviors beginning in adolescence through young adulthood. The first 3 items assessed adolescents' sexual behaviors over the past 6 years (number of vaginal sex partners, number of oral sex partners, and whether they had engaged in anal sex). For each partner listed, respondents were asked, "Have you ever had vaginal intercourse with your partner? By vaginal intercourse, we mean when a man inserts his penis into a woman's vagina." Responses were coded 0 = no partners, 1 = 1 partner, 2 = 2 to 4 partners, and 3 = 5 or more partners. For oral sex, participants were asked, "Have you ever performed oral sex on your partner? That is, have you ever put your mouth on his penis?" Response options were 0, 1, 2, or 3 partners to reflect the number of oral sex partners in the past 6 years. The responses were capped at 3, as very few participants reported having more than 3 oral sex partners in the past 6 years. Finally, participants were asked

whether they had engaged in anal sex (0 = no, 1 = yes): "Has your partner ever performed anal sex or anal intercourse on you? By anal sex, we mean when a man inserts his penis into his partner's anus or asshole."

Two items gauged risky sexual partner behavior. The first item asked about concurrent sexual partners in the past 6 years: "As far as you know, during the time you and your partner have had a sexual relationship, has your partner had any other sexual partners?" The second item asked about knowledge of sexual partners' STI status in the past year: "Now think about this person/these people with whom you had vaginal intercourse in the past 12 months. To the best of your knowledge, did he/any of them ever in his life/their lives have a sexually transmitted disease or STD?" Responses were coded 0 = no, 1 = yes.

Two items asked about past-year sexual behavior to account for the period in which STIs were most likely acquired: "With how many different partners have you had vaginal intercourse in the past 12 months?" Responses were 0, 1, or 2 partners to reflect the number of partners in the past year because very few participants reported more than 2 vaginal sex partners in the past 12 months. Participants were also asked about their overall condom use in the past year: "On how many of these occasions of vaginal intercourse in the past 12 months did you/your partner use a condom?" Reponses were coded 0 = no sex, 1 = never, 2 = sometimes, and 3 = always.

Finally, the last item asked about age at first vaginal intercourse: "How old were you the first time you had vaginal intercourse?" Reponses were coded 0 = 15 years or older or 1 = 14 years or younger; the cutpoint for early sexual initiation was based on previous literature that has used the same distinction.[4]

Sexually transmitted infection status. We assessed young adults' STI status using self-report and biospecimen indicators. Both methods were chosen to obtain the most comprehensive report of STIs for those who were diagnosed in the past year by a doctor as well as those who may have been unaware of a current infection. The self-report item read, "In the past 12 months, have you been told by a doctor or nurse that you had the following sexually transmitted diseases: a) chlamydia, b) gonorrhea, or c) trichomoniasis."

The biological assay results tested for current presence of chlamydia, gonorrhea, and trichomoniasis. Participants testing positive for an STI through biospecimen or self-report were coded 1 = positive; participants testing negative were coded 0 = negative.

Data Analysis

We used LCA[20–24] to identify distinct classes of behavior within a heterogeneous population, based on similar patterns of response to multiple sexual risk indicators.[25–29] LCA incorporates model covariates (i.e., age, education) and distal outcomes (i.e., STI status in young adulthood) associated with identified patterns of risk over time. We used M*plus* 6.1 (Muthén and Muthén, Los Angeles, CA) to conduct the analyses, which allowed for the estimation of models with missing data through full information maximum likelihood procedures (<10% data missingness).[30–32] M*plus* can also incorporate a clustered sampling strategy of adolescents within schools and sample weights to address Add Health's probability sampling procedures.[30]

We analyzed successive latent class models separately for Blacks, Hispanics, and Whites. We also compared the fit of unrestricted class models (i.e., item–response probabilities freely estimated for each class) with those of restricted class models (i.e., forced "nonsexually active" class to data). We used 3 fit indices to determine how well the model fit the data: (1) Bayesian information criterion, with lower

TABLE 1—Latent Class Probabilities for Young Black Females: Wave III, National Longitudinal Study of Adolescent Health, 2001–2002

Variable	Recent Abstainers (16.8%), Probability or OR (95% CI)	Moderate Risk (55.2%), Probability or OR (95% CI)	High Risk (28.0%), Probability or OR (95% CI)
No. vaginal sex partners (past 6 y)			
0	0.55 (0.48, 0.63)	0.02 (0.01, 0.04)	. . .
1	0.29 (0.23, 0.36)	0.47 (0.41, 0.52)	0.06 (0.02, 0.09)
2-4	0.16 (0.11, 0.20)	0.50 (0.45, 0.55)	0.58 (0.52, 0.65)
≥ 5	. . .	0.01 (0.00, 0.03)	0.36 (0.29, 0.42)
No. oral sex partners (past 6 y)			
0	0.66 (0.58, 0.75)	0.62 (0.56, 0.69)	0.17 (0.09, 0.26)
1	0.29 (0.21, 0.37)	0.34 (0.29, 0.39)	0.30 (0.24, 0.37)
2	0.05 (0.00, 0.10)	0.03 (0.01, 0.06)	0.31 (0.24, 0.38)
3	. . .	0.01 (-0.01, 0.02)	0.21 (0.15, 0.26)
Had anal sex (past 6 y)	0.09 (0.03, 0.14)	0.04 (0.02, 0.06)	0.39 (0.30, 0.48)
Partner had concurrent sex (past 6 y)	0.20 (0.11, 0.28)	0.26 (0.21, 0.31)	0.76 (0.68, 0.84)
Partner had STI (past y)	. . .	0.08 (0.06, 0.11)	0.36 (0.28, 0.43)
No. vaginal sex partners (past y)			
0	1.00 (Ref)	. . .	. . .
1	. . .	0.79 (0.73, 0.85)	0.36 (0.30, 0.42)
≥ 2	. . .	0.21 (0.15, 0.27)	0.64 (0.58, 0.70)
Condom use (past y)			
No sex	1.00 (Ref)	. . .	. . .
Never	. . .	0.27 (0.22, 0.31)	0.17 (0.13, 0.21)
Sometimes	. . .	0.42 (0.38, 0.47)	0.70 (0.65, 0.75)
Always	. . .	0.31 (0.27, 0.36)	0.13 (0.09, 0.18)
Early sexual onset (aged < 15 y)	0.05 (0.02, 0.09)	0.17 (0.12, 0.22)	0.35 (0.30, 0.40)
Covariates			
Age	1.00 (Ref)	0.98 (0.85, 1.12)	1.03 (0.88, 1.21)
High school graduate	1.00 (Ref)	0.85 (0.50, 1.44)	1.56 (0.67, 3.66)

Note. OR = odds ratio; STI = sexually transmitted infection. The sample size was n = 1716.

values indicating better model fit; (2) Lo-Mendell-Rubin likelihood ratio test, with significant *P* values indicating that a model should be rejected in favor of a model with K–1 classes; and (3) entropy, with results closer to 1 preferred, to determine the number of classes that fit the data best.

RESULTS

Results from the Bayesian information criterion, Lo-Mendell-Rubin, and entropy tests indicated that a 3-class unrestricted model fit best for Blacks and Hispanics and a 4-class unrestricted model fit best for Whites. For Blacks, the classes were (1) recent abstainers, limited sexual activity (16.8%), characterized by no vaginal sex in the past year, limited sexual activity in the past 6 years, and the lowest prevalence of risky sexual partners and early sexual onset; (2) moderate risk, past-year single partner, vaginal sex (55.2%), reporting mostly a single vaginal sex partner in the past year, 1 to 4 vaginal sex partners in the past 6 years, limited oral and anal sex in the past 6 years, moderately risky partners, and the highest rates of consistent condom use; and (3) high risk, multiple risky partner, varied sexual activity (28.0%), with the majority reporting 2 or more vaginal sex partners in the past year; the highest rates of vaginal, oral, and anal sex in the past 6 years; riskiest sexual partners; most inconsistent condom use; and earliest sexual debut (Table 1). Age and education were not significantly related to class membership.

For Hispanics, the classes were (1) recent abstainers, limited sexual activity (24.9%), with no vaginal sex in the past year, limited sexual activity in the past 6 years, and the lowest rates of risky sexual partners and early sexual debut; (2) moderate risk, single partner, vaginal sex (48.5%), reporting mostly 1 sexual partner in the past year, limited sexual activity over the past 6 years, moderate rates of risky sexual partners, and lowest rates of condom use; and (3) high risk, multiple risky partner, varied sexual activity (26.7%), with the highest rates of vaginal, oral, and anal sex and risky sexual partners, inconsistent condom use, and earliest age of sexual initiation. Age and education were not significantly related to class membership (Table 2).

TABLE 2—Latent Class Probabilities for Young Hispanic Females: Wave III, National Longitudinal Study of Adolescent Health, 2001–2002

Variable	Recent Abstainers (24.9%), Probability or OR (95% CI)	Moderate Risk (48.5%), Probability or OR (95% CI)	High Risk (26.7%), Probability or OR (95% CI)
No. vaginal sex partners (past 6 y)			
0	0.61 (0.53, 0.70)	0.02 (0.00, 0.04)	. . .
1	0.28 (0.21, 0.35)	0.68 (0.59, 0.77)	0.08 (0.01, 0.15)
2–4	0.08 (0.04, 0.12)	0.29 (0.21, 0.38)	0.62 (0.53, 0.71)
≥ 5	0.03 (0.00, 0.06)	. . .	0.30 (0.18, 0.41)
No. oral sex partners (past 6 y)			
0	0.48 (0.36, 0.61)	0.37 (0.30, 0.44)	0.04 (-0.03, 0.11)
1	0.38 (0.28, 0.49)	0.62 (0.55, 0.69)	0.23 (0.15, 0.32)
2	0.09 (0.03, 0.14)	0.01 (-0.01, 0.04)	0.38 (0.31, 0.45)
3	0.05 (0.00, 0.09)	. . .	0.35 (0.24, 0.46)
Had anal sex (past 6 y)	0.11 (0.04, 0.18)	0.13 (0.08, 0.18)	0.53 (0.45, 0.62)
Partner had concurrent sex (past 6 y)	0.18 (0.09, 0.28)	0.19 (0.10, 0.27)	0.63 (0.56, 0.70)
Partner had STI (past y)	. . .	0.10 (0.05, 0.15)	0.17 (0.10, 0.24)
No. vaginal sex partners (past y)			
0	1.00 (Ref)	. . .	. . .
1	. . .	0.89 (0.84, 0.94)	0.56 (0.48, 0.64)
≥ 2	. . .	0.11 (0.06, 0.16)	0.44 (0.36, 0.52)
Condom use (past y)			
No sex	1.00 (Ref)	. . .	. . .
Never	. . .	0.44 (0.39, 0.49)	0.26 (0.16, 0.35)
Sometimes	. . .	0.36 (0.31, 0.41)	0.60 (0.52, 0.69)
Always	. . .	0.20 (0.16, 0.24)	0.14 (0.09, 0.19)
Early sexual onset (aged < 15 y)	0.06 (0.02, 0.10)	0.12 (0.07, 0.18)	0.26 (0.19, 0.33)
Covariates			
Age	1.00 (Ref)	1.12 (1.00, 1.26)	1.03 (0.89, 1.19)
High school graduate	1.00 (Ref)	0.52 (0.27, 1.02)	1.48 (0.56, 3.90)

Note. OR = odds ratio; STI = sexually transmitted infection. The sample size was n = 1181.

For Whites, the classes were (1) recent abstainers, limited sexual activity (18.8%), characterized by no history of vaginal sex in the past year, limited engagement in varied sexual behaviors in the past 6 years, limited partner risk behavior, and limited early sexual activity; (2) low risk, single partner, low condom use (21.6%), predominantly reporting a single sexual partner in the past 6 years, low risk sexual partners, and the lowest rates of condom use; (3) moderate risk, past-year single partner, varied sexual activity (38.1%), characterized by mostly a single vaginal sex partner in the past year, a moderate rate of varied sexual activity in the past 6 years, moderately risky partners, and the highest rates of consistent condom use; and (4) high risk, multiple risky partner, varied sexual activity (21.6%), with the highest number of vaginal sex partners in the past year; the most vaginal, oral, and anal sex partners in the past 6 years; the highest rates of risky partner behaviors; inconsistent condom use; and earliest sexual initiation (Table 3). When examining covariates, the likelihood of being in each risk class compared with that of being a recent abstainer increased with age; education was not significantly related to class membership.

The final set of analyses assessed the odds of contracting an STI by racial/ethnic group while controlling for age, education, and sexual risk class membership (Table 4). Overall, 29.3% of Blacks, 10.2% of Hispanics, and 6.1% of Whites self-reported or tested positive

TABLE 3—Latent Class Probabilities for Young White Females: Wave III, National Longitudinal Study of Adolescent Health, 2001–2002

Variable	Recent Abstainers (18.8%), Probability or OR (95% CI)	Low Risk (21.6%), Probability or OR (95% CI)	Moderate Risk (38.1%), Probability or OR (95% CI)	High Risk (21.6%), Probability or OR (95% CI)
No. vaginal sex partners (past 6 y)				
0	0.69 (0.66, 0.73)	0.00 (–0.01, 0.01)	0.01 (0.00, 0.02)	. . .
1	0.17 (0.14, 0.20)	0.92 (0.81, 1.03)	0.11 (0.04, 0.18)	. . .
2–4	0.11 (0.09, 0.13)	0.08 (-0.03, 0.18)	0.78 (0.73, 0.84)	0.43 (0.35, 0.52)
≥ 5	0.03 (0.01, 0.04)	. . .	0.10 (0.06, 0.15)	0.57 (0.49, 0.65)
No. oral sex partners (past 6 y)				
0	0.44 (0.39, 0.49)	0.13 (0.09, 0.16)	0.14 (0.10, 0.19)	0.01 (–0.01, 0.03)
1	0.34 (0.29, 0.38)	0.87 (0.81, 0.93)	0.30 (0.22, 0.38)	0.11 (0.07, 0.16)
2	0.12 (0.09, 0.15)	0.00 (–0.04, 0.05)	0.42 (0.37, 0.46)	0.18 (0.14, 0.23)
3	0.10 (0.07, 0.14)	. . .	0.14 (0.06, 0.23)	0.69 (0.63, 0.76)
Had anal sex (past 6 y)	0.11 (0.08, 0.14)	0.21 (0.18, 0.25)	0.19 (0.15, 0.23)	0.50 (0.44, 0.56)
Partner had concurrent sex (past 6 y)	0.24 (0.19, 0.29)	0.09 (0.06, 0.12)	0.30 (0.26, 0.34)	0.66 (0.58, 0.74)
Partner had STI (past y)	. . .	0.05 (0.03, 0.08)	0.05 (0.03, 0.06)	0.16 (0.11, 0.21)
No. vaginal sex partners (past y)				
0	1.00 (Ref)	. . .	. . .	. . .
1	. . .	0.95 (0.92, 0.97)	0.74 (0.69, 0.79)	0.46 (0.39, 0.53)
≥ 2	. . .	0.06 (0.03, 0.08)	0.26 (0.21, 0.31)	0.54 (0.47, 0.61)
Condom use (past y)				
No sex	1.00 (Ref)	. . .	. . .	. . .
Never	. . .	0.46 (0.40, 0.52)	0.34 (0.30, 0.39)	0.30 (0.26, 0.35)
Sometimes	. . .	0.37 (0.32, 0.42)	0.45 (0.40, 0.49)	0.62 (0.56, 0.67)
Always	. . .	0.17 (0.14, 0.21)	0.21 (0.18, 0.24)	0.08 (0.05, 0.11)
Early sexual onset < 15 y	0.05 (0.03, 0.07)	0.14 (0.10, 0.17)	0.18 (0.16, 0.21)	0.26 (0.20, 0.31)
Covariates				
Age	1.00 (Ref)	1.21*** (1.12, 1.31)	1.12** (1.05, 1.20)	1.17*** (1.09, 1.25)
High school graduate	1.00 (Ref)	0.74 (0.40, 1.34)	0.57 (0.34, 0.96)	1.67 (0.74, 3.80)

Note. OR = odds ratio; STI = sexually transmitted infection. The sample size was n = 4118.
**P < .01; ***P < .001.

via biospecimen for an STI. For both Blacks and Whites, older females and high school graduates were less likely to have an STI; age and education were not significantly related to STI status for Hispanics. After accounting for covariates, classification in the moderate and high risk classes was associated with significantly increased odds of STIs across race/ethnicity; the low risk class for Whites did not significantly increase their odds of STIs compared with those of recent abstainers. In the moderate risk class, Hispanics were particularly at risk for STIs, being 3.9 times more likely to have an STI than recent abstainers; Blacks were 2.6 times more likely and Whites were 2.5 times more likely to have an STI than their respective recent abstainer class. The high risk class placed all groups most at risk for STIs, particularly for Whites, who were 6.1 times more likely to have an STI than the recent abstainer group. Hispanics were 5.5 times more likely and Blacks were 5.3 times more likely to have an STI than respective recent abstainers.

DISCUSSION

We examined how unique patterns of sexual risk behaviors in adolescence and young adulthood influence STI risk for females in diverse racial/ethnic groups using data from a large, nationally representative sample. The results of this research add to the literature by showing that distinct patterns of sexual risk behavior within racial/ethnic groups elevate risk for STIs in young adulthood.[6,17,18] Specifically, we found evidence for 3 classes of sexual risk behavior for Black and Hispanic females and 4 classes of behavior for White females. All racial/ethnic groups had recent abstainers, a moderate risk group, and a high risk group. The additional sexual risk class identified among White females was characterized as a monogamous, single-partner class and was not significantly different from the abstainer class in regard to risk for STIs, mostly because of self-reported partner monogamy.

Across racial/ethnic groups, the moderate risk class was most common, although sexual risk behaviors appeared to be different within each racial/ethnic group. Among Black females, the moderate risk class was characterized by low rates of oral and anal sex and higher rates of condom use, albeit inconsistent condom use, with only 31% reporting always using condoms in the past year with potentially risky partners. Among Hispanic females, the moderate risk class appeared monogamous, reporting high rates of single-partner sexual activity, yet demonstrated a high likelihood for STIs compared with recent abstainers, mostly because of high rates of partner STIs and low rates of condom use. This pattern is consistent with literature finding low condom use and high STI rates for Latinos.[12] White females in the moderate risk class had high rates of varied sexual activity (vaginal, oral, and anal sex) and early sexual debut but also had fewer risky partners, supporting the notion that sexual networks and partner behavior matter more for sexual health and STI risk than individual behaviors.[15,16]

As hypothesized, engagement in high-risk sexual behaviors was associated with the greatest odds of having an STI across race/ethnicity, although risk behaviors differed by racial/ethnic group. Whites had a high likelihood of STIs compared with the recent

TABLE 4—Odds Ratio Estimates for Sexually Transmitted Infections by Race/Ethnicity; Wave III, National Longitudinal Study of Adolescent Health, 2001–2002

Variable	Black, % or OR (95% CI)	Hispanic, % or OR (95% CI)	White, % or OR (95% CI)
STI base rate	29.3	10.2	6.1
Age	0.91* (0.84, 0.98)	1.04 (0.90, 1.19)	0.91* (0.85, 0.97)
High school graduate	0.50** (0.33, 0.77)	0.68 (0.34, 1.37)	0.35*** (0.22, 0.55)
Sexual risk class			
Recent abstainers (Ref)	1.00	1.00	1.00
Low risk	. . .	. . .	1.71 (0.76, 3.85)
Moderate risk	2.55*** (1.69, 3.83)	3.86** (1.61, 9.25)	2.46* (1.31, 4.61)
High risk	5.32*** (3.06, 9.26)	5.46** (2.18, 13.67)	6.07*** (3.11, 11.83)

Note. OR = odds ratio; STI = sexually transmitted infection.
*$P < .05$; **$P < .01$; ***$P < .001$.

abstainer class, as exhibited by high rates of varied sexual activity, risky sexual partners, inconsistent condom use, and early sexual onset. The pattern for Blacks and Hispanics was more similar, with the high risk class representing the greatest prevalence of risky partners, inconsistent condom use, and early sexual onset, which significantly increased odds for STIs. Thus, engagement in risky sexual behaviors with risky partners most increased the odds of having an STI across all racial/ethnic groups.

Although our findings regarding higher risk behaviors equating to greater odds of STIs are not unexpected, when examining risk behaviors within each racial/ethnic group, we saw variation in risk activity and associated STI rates. For Blacks, the variety of sexual behaviors did not appear to increase the risk for STIs. Blacks engaged in oral and anal sex less often than Hispanics and Whites; however, base rates for STIs were 5 times higher than those for Whites and 3 times greater than those for Hispanics. This finding appeared to be driven most by risky partner characteristics. These findings support the idea of sexual networks, particularly in the Black community, in which the pool of partners is more likely to have an STI.[15] As the choice of potential partners becomes narrower, the risk of exposure to STIs increases. Hence, an individual may engage in risky activity, but it is perhaps more pertinent to consider the network of available sexual partners when examining the STI epidemic. We also found consistent support across risk classes that age of sexual onset and inconsistent condom use contributed to risk for STIs in young adulthood. The risk classes with the largest proportion of youths reporting sex before age 15 years and inconsistent use of condoms were at highest risk for STIs in young adulthood.

On the basis of our findings, we recommend 3 avenues for prevention efforts to curb the increasing rate of STIs. First, interventions need to target youths before they reach the age of 15 years or become sexually active, particularly Black girls. For instance, adolescents would benefit from sexual education classes beginning in middle school. In addition to education on sexual health, providing adolescents information on communication skills in negotiating romantic relationships and talking to partners and family members about contraception use is key. A second implication for intervention regards condom use, particularly for Hispanics, who reported the lowest rates of use. Education is needed to reinforce the message that only consistent and correct condom use during every sexual encounter effectively protects against STIs. An interesting finding was that completion of high school was not a significant predictor of STI status for Hispanics. Perhaps interventions need to focus on other factors related to condom use, such as cultural barriers to communication and inequality in gender roles regarding decisions about contraception use. Third, greater investment is needed in preventive medicine during adolescence and in consistent health care into early adulthood. The recommended age for first gynecological health screening for females is between 13 and 15 years.[33] However, adolescents who engage in sexual intercourse before age 15 years are most at risk for STIs long term; in this study, this group was predominantly African American. Adolescents need information on how to access doctors at an early age, particularly if they cannot turn to their parents for guidance.[34] The health care system should also consider not only focusing on the individual level but targeting the couple and community levels to curb the rapid spread of disease in dense sexual networks, especially for African Americans. Both members of a couple need to receive testing for and treatment of STIs before a sexual relationship begins. To best reverse the epidemic of STIs among youths, access to information regarding comprehensive health services is necessary for adolescents and young adults.

Limitations

Although our findings offer clear directions for preventive interventions, future research should address the limitations to our study. First, the secondary data did not allow for full exploration of additional sexual risk behaviors, such as age at first anal or oral sexual activity. In addition, substance use before and during sexual activity is a strong predictor of engagement in sexual risk behaviors, particularly among White youths.[4] Future researchers would be wise to include this indicator in person-centered models.

The study was also retrospective in design; research would benefit from longitudinal methods examining behavior as it unfolds over time. Also, including sexual partner reports of sexual behavior in addition to self-reports with concurrent partners would be interesting to truly understand the impact of partner behavior on risk for STIs. Finally, we did not include males in this study; future researchers should consider examining sexual risk patterns by gender and in dyadic partner designs.

Future Directions

Overall, the current findings extend previous STI research by using a person-centered approach with a large, nationally representative sample to elucidate unique patterns of sexual risk behaviors within diverse racial/ethnic groups and links to STIs. The use of

person-centered approaches offers unique insight into how patterns of sexual behaviors group together to influence risk, which moves beyond traditional variable-centered and between-group designs. Thus, person-centered approaches provide a promising direction for future research in the area of adolescent and young adult sexual reproductive health. ■

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Contributors

J. C. Pflieger, E. C. Cook, and C. M. Connell formulated the study idea, conducted the statistical analysis, and contributed to writing the original article. L. M. Niccolai provided consultation on formulating the research questions and interpreting the statistical results. All authors contributed to article revisions and provided feedback on drafts of the article.

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Human Participant Protection

Institutional review board granted exempt status for this research due to the secondary nature of the analyses.

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