Associations Between Patterns of Emerging Sexual Behavior and Young Adult Reproductive Health

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CONTEXT: *Identifying young adult outcomes associated with adolescent sexual behavior, including patterns of first oral, vaginal and anal sex, is critical to promoting healthy sexual development.*

METHODS: *Associations between patterns of emerging sexual behavior, defined using latent class analysis, and young adult sexual and reproductive health were examined among 9,441 respondents to Waves 1 (1994–1995), 3 (2001–2002) and 4 (2008) of the National Longitudinal Study of Adolescent Health. Logistic regression analyses examined associations between class membership and young adult outcomes, and tested for interactions by race and ethnicity.*

RESULTS: *Compared with respondents who initiated vaginal sex first and reported other sexual behaviors within two years, those who initiated oral and vaginal sex during the same year had similar odds of having had an STD diagnosis ever or in the last year, of having had concurrent sexual partnerships in the last year and of having exchanged sex for money. However, respondents who postponed sexual activity had reduced odds of each outcome (odds ratios, 0.2–0.4); those who initiated vaginal sex and reported only one type of sexual behavior had reduced odds of reporting STD diagnoses and concurrent partnerships (0.4–0.6). Respondents who reported early initiation of sexual activity combined with anal sex experience during adolescence had elevated odds of having had concurrent partnerships (1.6). The data suggest racial and ethnic disparities even when patterns of emerging sexual behavior were the same.*

CONCLUSIONS: *Patterns of early sexual behavior considered high-risk may not predict poor sexual and reproductive health in young adulthood.*

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The emergence of partnered sexual activity during adolescence and nascent adulthood is a normative developmental process, and the vast majority of Americans initiate sexual activity prior to marriage.[1] By age 17, some 49% of males and 40% of females report having engaged in some type of partnered sexual behavior (e.g., vaginal, oral or anal sex).[2] By their late 20s, most individuals, regardless of marital status, have engaged in both vaginal and oral sex.[3]

Although statistically and developmentally normative, initiation of sexual activity is not without risk. Youth aged 15–24 make up 25% of sexually experienced individuals in the United States, but they account for half of all new STD cases each year.[4] Certain racial and ethnic minority groups bear a disproportionate STD burden.[5] In 2009, for example, 71% of reported cases of gonorrhea, 52% of cases of primary and secondary syphilis, and 48% of chlamydia cases occurred among blacks.[6] Concerns over these and other potential negative consequences of adolescent sexuality underlie state and federal policies that promote sexual abstinence until marriage; however, such policies reflect untested assumptions about optimal pathways of sexual development and the implications of adolescent behaviors for adult outcomes. Understanding whether certain patterns of sexual behavior are associated with sexual and reproductive health risk is a critical step in identifying ways to promote healthy sexual development across the life course.

The majority of research on adolescent sexual behavior has focused on the predictors and correlates of adolescent sexual activity, paying relatively little attention to potential associations between adolescent sexuality and adult health. Some data suggest, however, that certain patterns of adolescent sexual behavior may be associated with poor adult sexual and reproductive health. For example, early initiation of vaginal sex is associated with an increased lifetime number of sexual partners[7] and STD risk,[8] although the latter association appears to decrease with age.[9] Similarly, young adults who had nonmonogamous or nonromantic sexual partners during adolescence, compared with those who had not, report a greater number of recent sexual partners.[10]

This research, although intriguing, has important limitations. First, the vast majority of empirical work on adolescent sexuality defines sexual behavior solely as vaginal sex, but the scant research on noncoital sexual activities suggests that they warrant attention. Both anal sex and, to a lesser extent, oral sex are implicated in the transmission of viral[11] and nonviral[12] STDs. Among heterosexuals, noncoital behaviors are associated with lower rates of condom use than is vaginal sex.[13–15] Some evidence suggests

that youth may forgo condoms during oral sex because they do not perceive it as especially risky[16] or even regard it as sex.[17,18] Early initiation of anal sex may also signal involvement in other sexual risk behaviors, such as early vaginal sex, use of unreliable contraceptive methods and unprotected vaginal intercourse.[19] Adolescents who report recent anal sex are more likely than others to test positive for an STD.[20,21]

Second, the exclusive focus on vaginal sex limits understanding of how coital and noncoital behaviors may jointly contribute to patterns of sexual behavior that emerge over time. Even though the concept of a "developmental progression" has been widely applied to other domains of adolescent behavior, such as romantic relationships,[22,23] substance use histories[24,25] and antisocial conduct,[26] most research on emerging sexual behavior focuses on the timing of an isolated, decontexualized event—typically first vaginal sex—as the sole measure of adolescent sexuality.[27] Thus, little is known about how the sequence, spacing, timing and variety of new sexual experiences interact to form broad patterns of emerging sexuality—and how these patterns may be associated with subsequent sexual and reproductive health. In one notable exception, Dutch researchers found that contraceptive use and (among females only) unprotected anal sex were more common among young adults who reported "nonlinear" progressions of noncoital and coital initiation, in which more intimate behaviors had preceded less intimate behaviors, than among those who reported linear progressions.[28] Greater sexual variety—that is, engaging in sexual activity other than vaginal intercourse—has also been linked cross-sectionally to greater sexual risk-taking among young black females.[29]

Last, while studies have examined racial and ethnic differences in the prevalence and timing of early sexual behavior,[30–32] few have considered whether associations between early sexual behavior and young adult reproductive health vary by race and ethnicity and, if so, whether these differences contribute to persistent disparities in STDs and other reproductive health outcomes. Differences in individual behaviors (e.g., patterns of condom use or age at first sex) do not explain racial and ethnic disparities in reproductive health, and contextual factors such as segregated sexual networks and high-risk partner pools play a substantial role.[33,34] Whether differences in patterns of emerging coital and noncoital sexual behavior provide additional explanatory power is unknown.

In this study, we build on prior research by describing, in a nationally representative sample, associations between patterns of sexual initiation during adolescence and emerging adulthood, and young adult reproductive health and sexual risk-taking. Our definition of early sexual patterns includes the timing, sequencing, spacing and variety of both coital and noncoital behaviors. We examine four key outcomes that have been widely explored in the sexual and reproductive health literature: lifetime and past-year history of STD diagnosis; and past-year concurrent sexual partnerships and exchange of sex for money (including both receiving and giving money in exchange for sex). We also capitalize on the social and demographic diversity of our sample to explore whether associations between early sexual patterns and these outcomes vary by race and ethnicity.

METHODS

Data

We used data from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative sample of U.S. adolescents in grades 7–12 during the 1994–1995 school year. The Add Health sample design and procedures have been described in detail elsewhere.[35] To date, four waves of in-home data collection have followed respondents from adolescence to young adulthood. The Wave 1 sample consisted of 20,745 respondents who completed a 90-minute interview; this wave also included 30-minute interviews with 85% of respondents' parents. A total of 14,738 respondents completed Wave 2 interviews in 1996, when they were in grades 8–12. Wave 3 interviews were completed between 2001 and 2002 by 15,197 respondents, who were aged 18–26. Finally, 15,701 respondents completed Wave 4 interviews in 2008, at ages 26–32.

We restricted our analytic sample to the 12,288 respondents who participated in Waves 1, 3 and 4 and had valid sample weights. We excluded 895 respondents because they lacked data either on lifetime history or on age at initiation of oral, anal or vaginal sex. We also excluded 1,527 respondents because they lacked data on social or demographic characteristics or other covariates. Because patterns of sexual development may differ substantially between sexual minority and sexual majority individuals, we also excluded the 1,452 respondents who reported ever having had a sexual relationship with a member of the same sex. Applying these exclusion criteria yielded an analytic sample of 9,441; sample sizes for each model varied slightly because of missing data.

Measures

•***Adolescent sexual patterns***. In prior work,[36] we used latent class analysis to assign respondents to one of five "emergent sexual behavior" classes.* This approach was based on the premise that simultaneously considering multiple characteristics of early sexual experiences may provide greater explanatory power than examining discrete measures of sexual behavior. It also allowed us to consider the implications of overall patterns of emergent sexual behavior, rather than simply examine associations between specific high-risk behaviors and subsequent reproductive health outcomes.

*Latent class analysis is a statistical method used to identify unobserved subgroups within a given population on the basis of individuals' responses to survey questions. It bases the probability of class membership for each individual on the probability that a randomly selected individual in a given class will have a specific response to a given question.

Latent classes were derived from five variables constructed from Wave 4 survey items asking respondents to report whether they had ever engaged in vaginal, oral or anal sex. Respondents reported the age (in whole years) at which they first experienced each behavior. We used this information to construct the following variables: timing of first sexual experience, number of sexual behaviors in which the respondent had ever engaged, spacing between first and second behaviors, anal sex before age 18 (a dichotomous measure) and first sexual behavior initiated. Spacing between first and second behaviors was coded as within the same year; one, two, 3–5, or six or more years apart; or participant had engaged in only one type of behavior. First sexual behavior initiated was coded as vaginal sex first, oral sex first, vaginal and oral sex at the same age, or anal sex first or at the same age as vaginal or oral sex (or all three behaviors initiated at the same age).

In preliminary analyses stratified by social and demographic characteristics (parent educational attainment, race and ethnicity, chronological age and gender), latent class structures were largely similar across population subgroups; we therefore proceeded with latent class analysis of the full sample. The resulting five-class solution consisted of the following sexual behavior classes: vaginal initiators/multiple behaviors, dual initiators, vaginal initiators/single behavior, postponers and early/atypical initiators (see box).* This solution accounted for 80% of the variance in the variables described above. Additional details about the construction of emerging sexual behavior classes are available elsewhere.[36]

Latent classes analyzed in a study of 9,441 males and females aged 26–32, and defining features of their members, Wave 4, National Longitudinal Study of Adolescent Health

Vaginal initiators/multiple behaviors
- Sixty-nine percent initiated vaginal sex first; none initiated a second behavior within the same year.
- Average age at initiation was 15.7 years.
- All went on to initiate a second type of behavior, typically, oral sex; 60% did so within two years.
- Seven percent had anal sex before age 18.

Dual initiators
- All initiated oral and vaginal sex within the same year.
- Average age at initiation was 16.5 years.
- None had anal sex before age 18.

Postponers
- Eighty-five percent initiated oral and vaginal sex within the same year. The remainder initiated oral, vaginal and anal sex within the same year; initiated anal sex first; or initiated anal sex and vaginal or oral sex in the same year.
- Average age at initiation was 21.7 years.
- Fewer than 1% had anal sex before age 18.

Vaginal initiators/single behavior
- Sixty-five percent initiated vaginal sex first.
- Seventy-seven percent reported only one type of behavior.
- Average age at initiation was 17.8 years.
- Three percent had anal sex before age 18.

Atypical/early initiators
- Sixty-four percent initiated oral and vaginal sex within the same year. The remainder initiated oral, vaginal and anal sex within the same year; initiated anal sex first; or initiated anal sex and vaginal or oral sex in the same year.
- All initiated anal sex before age 18.
- Average age at initiation was 15 years.

•***Reproductive health and sexual risk-taking outcomes.*** We generated measures of self-reported lifetime history of STD diagnosis and past-year STD diagnosis according to whether respondents reported, at Wave 4, having received a diagnosis by a doctor, nurse or other health professional of one or more of the following diseases: chlamydia, gonorrhea, trichomoniasis, syphilis, genital herpes, genital warts, hepatitis B, human papillomavirus, pelvic inflammatory disease, cervicitis or mucopurulent cervicitis, urethritis, vaginitis, HIV or AIDS, or any other STD. We also examined the association between class membership and two other dichotomous measures of sexual behavior that are related to STD risk:[37,38] concurrent sexual partnerships in the past 12 months, measured by asking respondents if they had "[had] sex with more than one partner around the same time" in the past year; and the number of times respondents had exchanged money for sex in the past 12 months. Responses to the latter variable were dichotomized to indicate whether this behavior had ever occurred in the past 12 months. For both measures, yes=1 and no=0.

•***Social and demographic characteristics.*** Using Wave 1 survey items, we derived measures of parent education (less than high school or GED; high school diploma; some college or post–high school business, trade or vocational education; or college graduate), self-identified race and ethnicity (Hispanic of any race, black, white or other), and family structure (two biological parents, other two-parent family, single-parent family or other family structure). Participants' age at Wave 4 was calculated by subtracting their date of birth from the interview date. Gender was provided by respondents' self-report.

•***Additional covariates.*** We controlled for a number of additional behavioral and psychosocial characteristics to minimize the possibility that any observed associations between class membership and reproductive health outcomes were related to common distal causes. Selection of these covariates was informed primarily by problem behavior theory,[39] and was supported by prior research documenting associations between these variables and patterns of adolescent sexual activity.[1] Except where noted, all covariates were measured at Wave 1.

Consistent with prior analyses of Add Health data,[40] we defined parent-adolescent relationship quality by summing responses to four questions regarding respondents' perceptions of closeness, communication satisfaction, relationship satisfaction and warmth with each resident parent (Cronbach's alpha, 0.85); in cases in which both parents were present in the household, we selected the higher of the two scores. We based high school academic achievement on respondents' self-reported grades in

*We assigned respondents to the class for which they had the highest estimated probability of membership. Following convention, our class names describe the modal behavioral profiles that distinguish each class.

English or language arts, social science or history, mathematics and science classes during the most recent grading period; we calculated achievement by converting the reported letter grades to a numeric scale (A=4, B=3, C=2, D or lower=1) and averaging grades across subjects. On the basis of respondents' reported use of tobacco, alcohol, marijuana and other illegal drugs, we created a summary measure of adolescent substance use, which captures both the severity (e.g., frequency or quantity) and the variety of recent substance use.[41] Respondents were assigned one point if they reported cigarette or other tobacco use in the last 30 days, two points if they reported marijuana use in the last 30 days or alcohol use in the last 12 months, and three points if they reported using hard drugs (such as cocaine, inhalants or illegal injectable drugs) in the last 30 days; points were summed to create an overall substance use score for each respondent (range, 0–8). We measured religiosity by summing responses to questions assessing the importance of religion, frequency of prayer and attendance at religious services (Cronbach's alpha, 0.95). Last, we generated a measure of perceived parental attitudes toward sexual activity; we based this measure on the sum of respondents' reports of their mother's and father's attitudes toward their having sex and their having sex with a steady partner (Cronbach's alpha, 0.95). Scores were averaged across parents and across items, and coded so that a higher score indicated greater disapproval of adolescent sexual activity.

Given evidence that childhood abuse and neglect[42] (particularly childhood sexual abuse[43,44]), as well as forced or coerced sex,[45] are associated with both STD risk and sexual risk behavior, we included controls for these experiences. We derived a dichotomous measure of any history of childhood abuse or neglect from responses to questions at Waves 3 and 4 regarding physical abuse prior to age 18 ("How often did a parent or adult caregiver hit you with a fist, kick you, or throw you down on the floor, into a wall or down stairs?"), sexual abuse prior to age 18 ("How often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?") and physical neglect prior to sixth grade ("How often had your parents or other adult caregivers not taken care of your basic needs, such as keeping you clean, or providing food or clothing?"). Dichotomous indicators of lifetime experiences of physically forced and non–physically coerced sex, both exclusive of experiences with parents or other adult caregivers, were obtained from Wave 4 survey items.

Analysis

We first assessed characteristics of the analytic sample using weighted percentages and means, and then used logistic regression models to examine associations between class membership and concurrent sexual partnerships, and exchanging money for sex, both in the past 12 months. We also examined associations between class membership and self-reported STD diagnoses—during participants' lifetime and the past year. In each model, the modal latent class served as the referent. We used cross-product interaction terms to test whether race and ethnicity moderated associations between class membership and young adult reproductive health and sexual risk-taking outcomes; we set alpha levels at .10. To further explore significant interactions, we calculated the predicted probability of each outcome, according to race and ethnicity and latent class, by averaging probabilities across cases. All analyses were conducted in Stata 11.0. We used survey commands to adjust for Add Health's complex survey design and applied sampling weights to obtain nationally representative population estimates.

RESULTS

Sample Characteristics

Half of respondents were classified as vaginal initiators/multiple behaviors (Table 1, page 222); this group was characterized primarily by initiation of vaginal sex first, at an average age of approximately 16 years, and initiation of a second behavior (typically oral sex) within two years. One-third of respondents initiated oral and vaginal sex within the same chronological year, and were classified as dual initiators. The remaining sexual behavior classes each contained fewer than one in 10 respondents.

Lifetime history of STD diagnosis was the most prevalent reproductive health outcome (reported by 23% of respondents), followed by concurrent sexual relationships in the past 12 months (13%), STD diagnosis in the past 12 months (9%) and history of exchanging sex for money in the past year (2%). The majority of respondents were white (68%), had at least one parent with some postsecondary education (63%) and had lived with both biological parents during adolescence (60%). Respondents reported relatively high-quality relationships with their parents (mean, 17.8; range 4–20), low levels of substance use (mean, 1.6; range 0–8), moderate grade point averages (mean, 2.8; range 1–4), high levels of perceived parental disapproval of sex (mean, 4.2; range 1–5) and moderate levels of religiosity (mean, 11.3; range 3–17).

Bivariate Associations

Three of the four sexual and reproductive health outcomes examined varied significantly across latent classes (Table 2, page 222). Lifetime STD diagnosis occurred most frequently among vaginal initiators/multiple behaviors and early/atypical initiators (27% and 22%, respectively), as did self-reported STD diagnosis in the past year (11% and 9%). Concurrent sexual relationships in the past 12 months were more common among early/atypical initiators (20%) than among other classes (3–13%). Postponers—whose average age at initiation of sexual activity was about 22 years—reported the lowest prevalence of lifetime STD diagnosis (6%), past-year STD diagnosis (3%) and past-year concurrent partnerships (3%). While the proportion of respondents who reported having

TABLE 1. Selected characteristics of a sample of respondents to Waves 1, 3 and 4 of the National Longitudinal Study of Adolescent Health

Characteristic	% (N=9,441)
PERCENTAGES (WAVE 4)	
Emerging sexual behavior class	
Vaginal initiators/multiple behaviors	49.9
Dual initiators	31.5
Postponers	5.8
Vaginal initiators/single behavior	7.1
Early/atypical initiators	5.6
Lifetime STD diagnosis†	
No	77.5
Yes	22.5
STD diagnosis in past year‡	
No	90.9
Yes	9.1
Concurrent sexual relationships in past year§	
No	87.5
Yes	12.5
Exchanged sex for money in past year	
No	98.3
Yes	1.7
Childhood maltreatment	
No	70.0
Yes	30.0
Forced sex	
No	92.9
Yes	7.2
Coerced sex	
No	88.6
Yes	11.4
PERCENTAGES (WAVE 4) continued	
Age	
24–28	56.0
≥29	44.0
PERCENTAGES (WAVE 1)	
Gender	
Male	50.4
Female	49.6
Race/ethnicity	
White	67.6
Black	14.7
Hispanic	11.1
Other	6.6
Parent education	
<high school	10.7
High school/GED	26.5
Some college	30.2
College graduate	32.6
Family structure	
Two biological parents	60.4
Other two-parent family	16.7
Single parent	19.7
Other	3.3
Total	100.0
MEANS (WAVE 1)	
Parent relationship quality (range, 4–20)	17.8 (0.05)
Substance use (range, 0–8)	1.6 (0.06)
Grade point average (range, 1–4)	2.8 (0.02)
Perceived parent attitude toward sex (range, 1–5)	4.2 (0.03)
Religiosity (range, 3–17)	11.3 (0.13)

†N=9,327. ‡N=9,309. §N=9,423. *Notes:* Descriptions of emerging sexual behavior classes can be found in the box on page 220. Wave 1 was conducted in 1994–1995 (when respondents were in grades 7–12), Wave 3 in 2001–2002 and Wave 4 in 2008. Data for childhood maltreatment come from Waves 3 and 4. Percentages and means are weighted to yield national probability estimates for youth in grades 7–12 in the 1994–1995 school year. Figures alongside means are standard errors.

TABLE 2. Percentage distribution of young adults, by selected sexual and reproductive health outcomes, according to emerging sexual behavior class

Outcome	Vaginal initiators/ multiple behaviors	Dual initiators	Postponers	Vaginal initiators/ single behavior	Early/ atypical initiators
Lifetime STD diagnosis* **					
No	72.6	80.9	94.4	83.6	77.7
Yes	27.4	19.1	5.6	16.4	22.3
STD diagnosis in past year* **					
No	89.1	92.1	97.1	93.0	91.1
Yes	10.9	7.9	2.9	7.0	8.9
Concurrent partners in past year* **					
No	86.8	86.9	96.8	93.2	80.0
Yes	13.2	13.1	3.2	6.8	20.0
Exchanged sex for money in past year					
No	98.2	98.5	99.7	98.0	97.2
Yes	1.8	1.5	0.3	2.0	2.8
Total	100.0	100.0	100.0	100.0	100.0

***Distribution of outcome differs significantly across classes at p<.001. *Note*: Descriptions of emerging sexual behavior classes can be found in the box on page 220. Percentages and means are weighted to yield national probability estimates for youth in grades 7–12 in the 1994–1995 school year.

exchanged sex for money appeared to be lowest among postponers (0.3%) and highest among early/atypical initiators (3%), differences were not statistically significant.

Multivariate Associations

In our multivariate analysis (Table 3), respondents in the postponer and vaginal initiators/single behavior classes had lower odds than those in the vaginal initiators/multiple behaviors class of having ever received an STD diagnosis (odds ratios, 0.2 and 0.4, respectively) or of having received one in the past year (0.4 and 0.6). Postponers and respondents in the vaginal initiators/single behavior class had lower odds than respondents in the vaginal initiators/multiple behaviors class of reporting recent concurrent partners (0.3 and 0.4); the odds of this outcome were elevated for early/atypical initiators (1.6). Only postponers differed from vaginal initiators/multiple behaviors in their likelihood of having exchanged sex for money in the past year (0.2).

Several covariates had associations with multiple reproductive health and sexual risk-taking outcomes. For

TABLE 3. Odds ratios (and 95% confidence intervals) from logistic regression analyses examining associations between young adults' sexual and reproductive health outcomes and selected characteristics

Characteristic	Lifetime STD diagnosis (N=9,327)	STD diagnosis in in past year (N=9,306)	Concurrent partners in past year (N=9,421)	Exchanged sex for money in past year (N=9,419)
Emerging sexual behavior class				
Vaginal initiators/multiple behaviors (ref)	1.00	1.00	1.00	1.00
Dual initiators	0.87 (0.74–1.03)	0.91 (0.71–1.16)	1.03 (0.84–1.26)	0.85 (0.51–1.43)
Postponers	0.23 (0.15–0.38)**	0.35 (0.20–0.61)**	0.27 (0.16–0.45)**	0.22 (0.08–0.61)**
Vaginal initiators/single behavior	0.44 (0.31–0.63)**	0.61 (0.38–0.96)*	0.43 (0.28–0.66)**	0.71 (0.30–1.66)
Early/atypical initiators	1.05 (0.75–1.45)	1.03 (0.67–1.59)	1.56 (1.03–2.36)*	1.37 (0.64–2.96)
Race/ethnicity				
White (ref)	1.00	1.00	1.00	1.00
Black	3.44 (2.79–4.24)**	1.90 (1.43–2.53)**	2.51 (1.97–3.21)**	3.94 (2.32–6.69)**
Hispanic	1.40 (1.07–1.83)*	1.68 (1.16–2.44)**	1.48 (1.11–1.97)**	1.90 (1.01–3.60)*
Other	1.17 (0.82–1.67)	0.95 (0.63–1.46)	0.97 (0.67–1.39)	1.42 (0.54–3.73)
Parent education				
<high school	0.83 (0.62–1.12)	0.66 (0.46–0.94)*	0.89 (0.65–1.21)	1.65 (0.89–3.04)
High school/GED	0.88 (0.74–1.04)	0.95 (0.76–1.19)	0.92 (0.73–1.17)	1.38 (0.82–2.32)
Some college	0.87 (0.72–1.04)	0.87 (0.65–1.15)	1.00 (0.78–1.28)	0.58 (0.30–1.10)
College graduate (ref)	1.00	1.00	1.00	1.00
Family structure				
Two biological parents (ref)	1.00	1.00	1.00	1.00
Other two-parent	0.96 (0.75–1.23)	0.79 (0.58–1.09)	1.15 (0.90–1.48)	0.70 (0.35–1.37)
Single parent	1.00 (0.82–1.21)	1.03 (0.81–1.32)	1.13 (0.91–1.40)	1.11 (0.65–1.90)
Other	1.01 (0.67–1.50)	1.01 (0.62–1.63)	1.26 (0.72–2.21)	0.45 (0.18–1.12)
Age				
24–28 (ref)	1.00	1.00	1.00	1.00
≥29	0.79 (0.66–0.94)**	0.63 (0.50–0.79)**	0.74 (0.62–0.88)**	1.27 (0.76–2.12)
Male	0.31 (0.27–0.37)**	0.33 (0.26–0.41)**	2.68 (2.20–3.26)**	6.09 (3.20–11.59)**
Religiosity	0.99 (0.97–1.01)	1.00 (0.98–1.02)	0.99 (0.97–1.01)	1.02 (0.95–1.09)
Grade point average	0.93 (0.84–1.03)	0.92 (0.82–1.04)	0.88 (0.78–0.99)*	0.78 (0.54–1.12)
Parents' attitudes toward sex	0.86 (0.77–0.97)*	0.97 (0.86–1.08)	1.02 (0.90–1.17)	1.01 (0.68–1.51)
Substance use	1.09 (1.04–1.14)**	1.08 (1.02–1.15)**	1.08 (1.03–1.13)**	1.13 (0.99–1.29)
Coerced sex	1.46 (1.14–1.89)**	1.14 (0.85–1.54)	1.72 (1.26–2.36)**	1.24 (0.62–2.49)
Forced sex	1.47 (1.11–1.96)***	1.16 (0.80–1.70)	1.01 (0.63–1.62)	0.90 (0.32–2.52)
Childhood maltreatment	1.43 (1.24–1.65)**	1.45 (1.20–1.77)**	1.27 (1.05–1.55)*	2.26 (1.43–3.59)**
Parent relationship quality	0.96 (0.93–0.99)*	0.96 (0.93–1.00)*	0.97 (0.94–1.01)	0.96 (0.86–1.08)

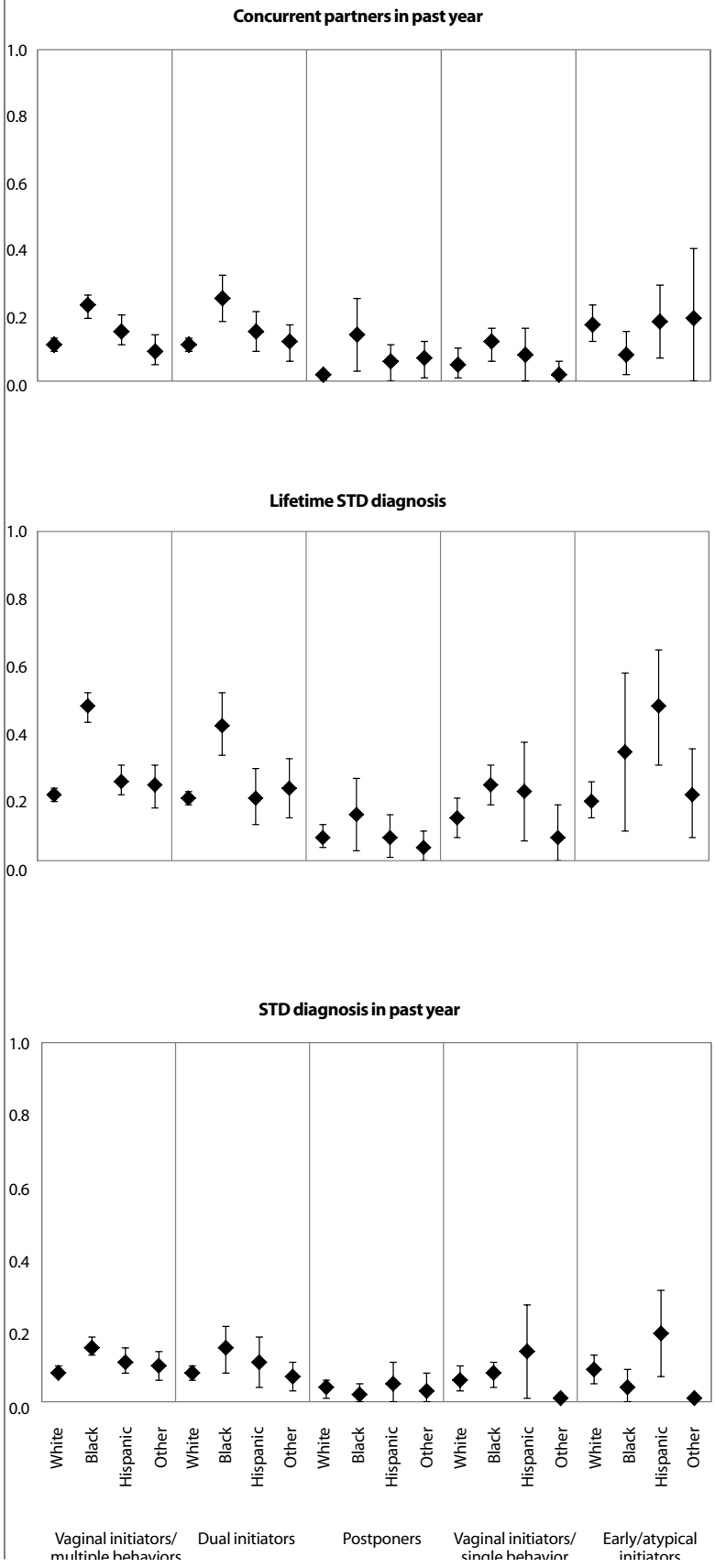
*p<.05. **p<.01. ***p<.001. *Notes:* ref=reference category. Descriptions of emerging sexual behavior classes can be found in the box on page 220. ref=reference category. Gender, coerced sex, forced sex and childhood maltreatment are dichotomous measures. All other measures for which no reference category is shown are scaled.

example, substance use, coerced sex and childhood maltreatment were positively associated with multiple outcomes, while age and parent relationship quality were negatively associated. Blacks and Hispanics had elevated odds of all outcomes.

Racial and Ethnic Differences

Global tests of the interaction between race and ethnicity and latent class membership were significant for all outcomes except past-year history of having exchanged sex for money. Risk was unevenly distributed across racial and ethnic groups within each latent class (Figure 1, page 224), although small cell sizes precluded our ability to make pairwise comparisons between racial and ethnic groups. In general, the predicted probabilities suggest a higher likelihood of both past-year and lifetime history of STD diagnosis among nonwhite respondents, regardless of latent class membership. For example, within the vaginal initiators/multiple behaviors class, the predicted probability of ever having received an STD diagnosis was 47% among blacks and 20% among whites; among postponers, the predicted probabilities for these groups were 14% and 7%, respectively. Patterns were similar, but less pronounced, with respect to recent diagnosis. Hispanic early/atypical initiators, for example, had a 19% chance of reporting an STD diagnosis in the past 12 months, while whites in the same class had a 9% chance. The predicted probability of concurrent partnerships appeared to be elevated among blacks in all classes except early/atypical initiators; in this class, whites had a 17% chance of having

FIGURE 1. Predicted probabilities of young adults' selected sexual and reproductive health outcomes, by emerging sexual behavior class, according to race and ethnicity



had concurrent sexual partnerships in the past 12 months, whereas blacks had an 8% chance.

DISCUSSION

While a number of studies have explored adult sexual and reproductive health in relation to single aspects of adolescent sexuality, this study is among the first to examine associations with broad patterns of emerging coital and noncoital sexual behaviors. Compared with the sexual behavior patterns among vaginal initiators/multiple behaviors, only those among postponers were consistently associated with lower reproductive health risk and sexual risk-taking in young adulthood across all outcomes. This class was highly atypical—representing fewer than one in 10 respondents in this nationally representative sample. The vast majority of individuals belonged to classes characterized by initiation of vaginal sex, or vaginal and oral sex, during middle or late adolescence. For these classes, the associations between different patterns of emerging sexual behavior and subsequent reproductive health outcomes were more complex.

In general, greater variety of sexual experiences was negatively associated with reproductive health outcomes and positively associated with sexual risk-taking. Respondents in the vaginal initiators/single behavior class had lower odds of past-year or lifetime STD diagnoses and of past-year concurrent sexual partnerships than respondents in the vaginal initiators/multiple behaviors class; and early/atypical initiators had greater odds than vaginal initiators/multiple behaviors of reporting concurrent sexual partnerships in the past year. While these results largely support previous findings that young people's involvement in oral, anal and vaginal sex may indicate risky sexual behavior in general,[29] this trend was not entirely consistent across classes. Dual initiators did not differ significantly from vaginal initiators/multiple behaviors across any of the outcomes examined, even though the former reported initiation of a greater variety of sexual behaviors within a shorter period of time than the latter. In work on the implications of sexual variety among black females, Salazar et al. suggest that the association between sexual variety and reproductive health outcomes may depend on other relationship and partner characteristics (e.g., whether the relationship is romantic or casual, or whether the partner belongs to a sexual network characterized by high STD prevalence).[29] Although we were unable to explore these factors in the present analysis, they may contribute to the differences in reproductive health outcomes observed across classes and by race and ethnicity within classes.

Programmatic efforts directed toward delaying adolescent sexual activity have been based in part on the premise that early initiation is associated with poor reproductive and sexual health outcomes. Except for past-year concurrent sexual partnerships, however, we found that early/atypical initiators were no more likely to report negative reproductive health outcomes or sexual

risk-taking than were vaginal initiators/multiple behaviors. This lack of association is somewhat surprising, given the substantial differences in early sexual behavior between the early/atypical class and others; in the case of STD outcomes, it may reflect a lack of regular testing. If early/atypical initiators are less likely to receive regular STD testing, reliance on self-reported STD diagnosis may have obscured some associations between early/atypical sexual initiation and increased STD risk. Alternatively, perhaps the implications of early and atypical patterns of initiation do not extend past adolescence. Studies of the longitudinal effects of early onset of vaginal sex have supported this possibility. For example, negative associations between age at first vaginal sex and both STD risk and depressive symptoms appear not to endure into young adulthood.[9,46] At a minimum, the lack of clear associations between early/atypical initiation and elevated reproductive health risk suggests that early adolescent sexual activity by itself does not necessarily jeopardize future well-being.

Consistent with prior research,[33,34] our data suggest differences in reproductive health outcomes and sexual risk-taking across racial and ethnic groups. Moreover, the implications of various patterns of emerging sexual behavior appeared to vary by racial and ethnic group even when class membership was the same. For example, our data indicated that the probability of having received an STD diagnosis (ever and in the past year) was consistently elevated among blacks, regardless of class membership. Racial and ethnic differences in the implications of early sexual patterns appeared particularly striking in the early/atypical class: Compared with their white counterparts, blacks classified as early/atypical initiators appeared more likely ever to have had an STD diagnosis—even though their likelihood of having had concurrent partnerships in the past year appeared lower. These results underscore the need to consider whether and how structural and contextual factors, such as segregated sexual networks characterized by vastly different disease burdens,[47] contribute to greater STD vulnerability among certain racial and ethnic groups even when patterns of individual risk behavior are similar. However, given the relatively small size of the early/atypical class, these results should be interpreted with caution.

Our findings have a number of implications for future research on sexuality development. Beside postponing sexual expression well past adolescence and into emerging adulthood—a strategy that is inconsistent with most adolescent experience—no single pattern of emerging sexuality is clearly associated with young adult reproductive health or sexual risk-taking, at least with respect to the outcomes examined here. The complexity of these associations suggests that the contexts in which adolescent sexual behaviors occur, as well as their timing, frequency and sequencing, may play a role in their association with young adult sexual and reproductive health outcomes. Understanding the context of emergent sexual relationships[48] (i.e., whether they reflect personal values, desires and perceived social norms[49]), and the decision making that underlies the initiation of sexual activity,[50] is important to knowing why some behavioral pathways are associated with greater cumulative sexual risk-taking and poorer reproductive health than others. Similarly, certain patterns of early sexual behavior may be more typical of specific types of relationships. For example, individuals who initiate multiple behaviors in rapid succession may do so in the context of a single sexual or romantic relationship, while those who experience slower progressions may initiate each new behavior with a different partner.

Limitations

These results should be interpreted in light of several limitations. First, data constraints prevented inclusion of additional information—such as the sequencing of other noncoital behaviors, like masturbation, kissing or heavy petting—in the construction of latent classes. Since respondents reported ages at initiation of oral, vaginal and anal sex in whole years, our indicators of the sequence and spacing of sexual behaviors are relatively crude, as well as subject to the typical limitations of self-reported data. In addition, although we controlled for lifetime experiences of physically forced and non–physically coerced sex, we were unable to ascertain whether respondents' first experience with each behavior was voluntary; involuntary first sexual experiences may have implications for subsequent reproductive health and sexual risk-taking. While prior research suggests that the implications of different patterns of sexual behavior may vary by race and ethnicity, and by gender,[34] small sample sizes for certain combinations of class membership, race and ethnicity, and gender made it impossible to simultaneously test for such interactions. Our sample was limited to individuals who reported no same-sex partners, and our findings are therefore not necessarily generalizable to sexual minority individuals; we plan to examine patterns of sexual initiation among this population in future work.

Research points to a growing consensus that sexual satisfaction and other measures of positive sexuality are important elements of healthy sexual development.[51,52] While the outcomes examined here are widely used as broad measures of sexual risk-taking and negative reproductive health, other outcomes and processes should also be considered in future work—for example, early or unintended pregnancy, contraceptive use, sexual and relationship satisfaction, sexual self-concept, and how or whether relationship histories mediate associations between emerging sexual patterns and sexual and reproductive health outcomes.

Conclusion

During the past several decades, the federal government has directed approximately $1.5 billion toward policies that promote sexual abstinence until marriage.[53] These policies reflect strong assumptions about optimal pathways to sexual development that have not been subjected to

rigorous empirical tests and—as demonstrated across multiple studies[1,54]—are inconsistent with the vast majority of young people's experiences. Adolescent sexuality is certainly not without risk; but neither does it appear that patterns of early initiation traditionally viewed as high-risk necessarily predict long-term trajectories of poor sexual and reproductive health. As practitioners and researchers, we should focus on understanding the diversity of pathways that contribute to healthy sexuality development, as well as the potential risks and opportunities that sexual development presents.

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