

# EARLY INITIATION OF SEX, DRUG-RELATED RISK BEHAVIORS, AND SENSATION-SEEKING AMONG URBAN, LOW-INCOME AFRICAN-AMERICAN ADOLESCENTS

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The purpose of this study was to examine the relationship of early initiation of sex, drug-use, drug-trafficking, and sensation-seeking among urban, African-American adolescents. A longitudinal follow-up of 383 youth ages 9 to 15 years at baseline over four years with serial risk-assessments was used.

Sexual experience and several drug-related risk behaviors increased significantly during the four-year study interval. Sensation-seeking scores were higher after the baseline assessment among youth reporting tobacco, alcohol, and marijuana use and were higher, both at baseline and through several follow-up assessments, among youth reporting drug-selling and sexual activity. At baseline, the correlations among drug-related risk behaviors were all strong, except those between initiation of sex and drug-related risk behaviors. However, over time, early initiators of sex were significantly more likely to report involvement in substance use and drug-delivery/sales than were late initiators. Youth reporting repeated involvement in drug-related activities were more likely to report intensive sexual involvement than they were to report experimental sex or no sex. Sensation-seeking scores were lower among youth reporting no involvement in risk behaviors. However, scores did not differ between youth exhibiting experimental behavior compared to youth demonstrating repeated risk involvement.

These results support the need for alternative experiences for youth exhibiting high levels of sensation-seeking and the need for early drug/sexual risk prevention programs. (*J Natl Med Assoc.* 2001;93:129-138.)

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**Key words:** adolescents ♦ sex ♦ drugs ♦ sensation-seeking

Much has been written regarding the association of adult sexual high-risk behavior and use of alcohol

and/or drugs. Substantial literature finds evidence of such an association,<sup>1-3</sup> with several studies confirming not only the relationship between high-risk sexual behavior and substance abuse, but also a positive correlation between HIV seroconversion and substance use.<sup>4-6</sup> However, in contrast to these findings supporting an association, several event-level studies have not found substance use to be associated with risky sexual practices.<sup>7-8</sup> These conflicting data have prompted investigators to search for more complex relationships that might explain the variable findings. Results from one

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**Table 1. Number (%) of Youth Involved in Risky Behaviors at Baseline and Six Follow-up Assessment Intervals**

Interval	Tobacco	Alcohol	Marijuana	Cocaine	Other drugs	Sold drugs	Delivered drugs	Had sex*
Baseline	51 (14)	54 (14)	17 (5)	7 (2)	5 (1)	20 (5)	9 (2)	138 (37)
6 months	34 (12)	39 (14)	12 (4)	3 (1)	4 (1)	18 (6)	12 (4)	81 (28)
12 months	46 (17)	40 (15)	24 (9)	2 (1)	1 (<1)	10 (4)	9 (3)	93 (34)
18 months	47 (18)	60 (23)	37 (14)	2 (1)	3 (1)	26 (10)	20 (8)	99 (38)
24 months	57 (23)	57 (23)	63 (26)	5 (2)	6 (2)	19 (8)	14 (6)	104 (43)
36 months	n/a <sup>2</sup>	63 (37)	64 (38)	5 (3)	6 (4)	21 (12)	15 (9)	80 (47)
48 months	27 (19)	64 (45)	61 (43)	3 (2)	8 (6)	16 (11)	10 (7)	86 (61)

\*"Ever had sex" at baseline and "had sex in the last six months" for each follow-up assessment.

study suggested that *repeated* drug use, compared to episodic use, may place an individual at particularly high risk for unsafe sex.<sup>6</sup> Other investigators have found that *sensation-seeking* appears to be a common link between drug-use and sexual risk-behavior.<sup>9</sup>

If controversial in adults, the relationship between sexual risk behavior and substance abuse, and the degree to which either or both of these behaviors are explained by sensation-seeking, is even less certain among adolescents. Overall, there is substantially less research regarding substance use and high-risk sexual behavior in younger populations. Moreover, the nature of the questions may differ between these populations. For example, while virginity is not an issue for most adults, clearly the timing of initiation of sexual intercourse is an important event for adolescents and may represent a

component of "risky sexual behavior" beyond the question of protected and unprotected sex. Although studies, both longitudinal and cross-sectional, do exist which suggest that youth engaging in one high risk behavior, including early initiation of sex, are more likely to engage in others,<sup>10-12</sup> a few studies have noted that in some cultures early initiation of sex may not correlate with drug-risk behaviors.<sup>13-14</sup> Moreover, the relationship between sexual risk behavior and some drug-related behaviors of increasing epidemiological importance among adolescents—drug-selling and drug-delivering<sup>15-16</sup>—has received only minimal investigation. However, there is some evidence that drug-trafficking may be associated with early initiation of sex.<sup>17</sup> Finally, the literature regarding sensation-seeking and high-risk sexual behavior among adolescents is conflicting, with some stud-

**Table 2. Association Between Sensation-Seeking Score (SSS) and from Involvement in Risk Behaviors at Baseline, 12, 24, and 48 Months**

Interval	SSS	Tobacco		Alcohol		Marijuana	
		No	Yes	No	Yes	No	Yes
Baseline	Mean (SD)	17.90 (4.99)	19.28 (3.91)	18.05 (4.87)	18.43 (4.83)	18.00 (4.90)	20.13 (3.38)
12 months	Mean (SD)	16.87 (4.95)	19.92† (4.48)	16.81 (4.74)	20.90‡ (4.90)	17.07 (4.93)	20.76† (4.35)
24 months	Mean (SD)	16.80 (4.96)	19.42† (4.64)	17.09 (5.10)	18.48 (4.55)	16.75 (5.01)	19.27* (4.53)
48 months	Mean (SD)	17.39 (5.80)	20.92† (4.41)	16.48 (5.91)	20.07‡ (4.81)	16.22 (5.64)	20.71‡ (4.73)

\*p < 0.05.  
†p < 0.01.  
‡p < 0.001.

ies documenting a relationship<sup>18</sup> and others finding no such relationship.<sup>19</sup>

In summary, many questions remain as to the relationship between risky sexual behavior and drug-risk behavior among adolescents. Accordingly, this manuscript reports on our attempts to address, among urban, low-income, early and mid-adolescent African-Americans, four lines of inquiry:

1. Is there a cross-sectional and/or longitudinal association between early initiation of sex and substance abuse?
2. Is early initiation of sex related to the “new” adolescent drug-related risk-behaviors, adolescent drug-selling and/or drug-delivering?
3. Are repeated sexual and drug risk behaviors more likely to be related than are experimental or transient behaviors?
4. Is a propensity for “sensation-seeking” associated with early initiation of sex, drug-use and/or drug-selling or delivering?

**METHODS**

**Subjects**

Subjects enrolled in the study for which these data were obtained included 383 African-American youth ages 9 to 15 years at baseline. Youth were recruited from nine recreation centers serving three urban, low-income public housing developments in a large Eastern city. Youth were participating in a randomized, controlled HIV-risk reduction inter-

vention, “Focus on Kids”. The final intervention series, focusing on decision-making with regard to abstinence and condom-use, consisted of eight weekly meetings (seven 1.5 hour-long sessions conducted in the nine participating recreation centers and one day-long session conducted in a rural campsite. The intervention has been described in detailed in previous publications.<sup>20-21</sup> Following procedures approved by the Institutional Review Board at the University of Maryland, research staff conducted three introductory sessions at each recreation center to describe the purpose, general design and enrollment criteria to potentially eligible youth. Interested youth were given written materials and consent forms to be signed by both the youth and their parent(s).

**Measures**

Each youth completed a multi-component risk assessment questionnaire, the Youth Health Risk Behavioral Inventory (YHRBI).<sup>22</sup> It was administered aurally and visually in private via a “talking” MacIntosh computer through individual ear-phones. The YHRBI, which employs local terms to assure comprehension, contains questions assessing demographic indices, knowledge, perceptions, expectations and past experience regarding risk behaviors, expectations and perceptions including sexual activity, drug-use (marijuana, cocaine, and other illicit drugs), alcohol-use, tobacco-use and drug-trafficking (drug-selling and drug-delivering). Items regarding sexual intercourse referred to “the

Table 2. (Continued)

Interval	SSS	Cocaine		Other drugs		Sold drugs		Delivered drugs		Had sex	
		No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Baseline	Mean	18.09	19.20	17.95	21.25	17.98	20.42	18.06	19.50	17.41	19.21†
	(SD)	(4.89)	(2.05)	(4.88)	(3.86)	(4.91)	(3.69)	(4.90)	(2.56)	(5.06)	(4.20)
12 months	Mean	17.47	22.00	17.50	21.00	17.35	19.78	17.36	19.56	16.98	18.60*
	(SD)	(5.01)	(1.41)	(5.01)	N/A	(5.06)	(2.95)	(5.06)	(3.09)	(5.08)	(4.68)
24 months	Mean	17.38	19.75	17.37	19.60	17.22	19.94	17.29	19.54	16.46	18.64†
	(SD)	(5.02)	(2.99)	(4.99)	(5.50)	(5.03)	(3.86)	(5.02)	(4.27)	(5.10)	(4.66)
48 months	Mean	18.09	19.67	17.92	21.43	17.83	20.36	17.94	20.44	16.85	18.92
	(SD)	(5.75)	(4.16)	(5.76)	(3.51)	(5.94)	(2.62)	(5.86)	(2.30)	(5.91)	(5.50)

\*p < 0.05.  
 †p < 0.01.  
 ‡p < 0.001.

past six months” except at baseline when the question assessed lifetime experience (“have you ever . . .?”). Items relevant to substance use, drug use, drug-selling and drug-delivering referred to “the past six months”.

The YHRBI was administered on-site in the nine recreation centers. A “round” required 11 weeks to administer the questionnaire (one week per each of the nine recreation centers and two weeks for make-up sessions). To maximize the likelihood that the follow-up assessment for any individual child would occur as close to a six-month interval as possible, the order of recreation centers followed a set schedule reproduced at each subsequent round. Baseline data, six, 12, 18, 24, 36 and 48-month follow-up data were obtained.

In addition, at baseline, 12, 24, and 48 months, “sensation-seeking” was assessed through administration of a 44-item modified version of Zuckerman’s “Sensation-seeking Scale”.<sup>23</sup> Internal consistency of the modified scale, as measured by Cronbach’s alpha, at four assessment periods (i.e., baseline, 12 months, 24 months, 48 months), ranged from .60 to .70, with an average of .64.

Youth received stipends following completion of each round of questionnaires. Stipends ranged from \$5.00 at baseline and increased to \$20.00 for the final assessment.

## Data Analysis

**Definitions.** “Early initiators of sex” were defined as those youth who were 12 years of age or younger when they had initiated sex. “Late initiators” were those youth who were at least 13 years of age or were still virgins at their last assessment period. “Repeated” involvement in risk behavior was defined as the behavior being reported in at least two assessment periods, while “experimental” involvement referred to risk participation reported at only one assessment interval.

**Analyses.** ANOVA analyses were conducted for comparisons with continuous variables. Chi-square analyses or Fisher’s Exact Test were conducted to determine statistical significance of differences between categorical variables. Pearson correlation coefficients were employed to assess the relationship among various risk behaviors both cross-sectionally and longitudinally. A single sensation-seeking score (i.e., the number of “sensa-

tion seeking” responses across all 44 items) was calculated for each participant, with a higher score indicating a higher level of sensation-seeking attitude. Because of the substantial evidence demonstrating the effect of gender and increasing age on risk involvement,<sup>24</sup> and evidence regarding the role of sensation-seeking in adolescent risk involvement, partial correlations were calculated to control for age, gender, and sensation-seeking, when appropriate.

## RESULTS

The study sample of 383 youth included 213 males (56%). Median age at baseline was 12 years. One-hundred-thirty-eight youth (36%) were sexually experienced at baseline; 123 (32%) initiated sex during follow-up assessment periods (i.e., from 6 months through 48 months), with a mean age of sexual onset of 12.67 years (SD = 1.71). One hundred seven (41%) of the sexually experienced youth initiated sex at age 12 or younger. During the 48 months follow-up, 120 youth (31%) reportedly remained virgins, including 34 (16%) of the males and 86 (51%) of the females in the study.

At baseline, 62 youth (48 males and 14 females) met the criteria for “early initiators” of sex (i.e.,  $\leq 12$  year old and had sex) and 28 youth (12 males, and 16 females) met the criteria for “late initiators” ( $\geq 13$  year old and no sex). Cumulatively over the four years, 107 youth (80 males and 27 females) were early initiators and 73 youth (19 males and 54 females) were late initiators.

Involvement in sexual intercourse and the drug-related risk behaviors at baseline and all subsequent follow-up points are depicted in Table 1. Tobacco-use remained comparatively stable, beginning at 14% and concluding at 19%. Alcohol consumption increased from 14% to 45%. Prevalence of marijuana use increased from 5% at baseline to 43% involvement by the 48 month follow-up. Use of cocaine and other illicit drugs (e.g., heroin) remained very low throughout the study (only 2% and 6% involvement respectively by the 48-month follow-up). Drug-selling and drug-delivering increased somewhat (5% to 11% and 2% to 7%, respectively). After baseline (at which “sex ever” had been assessed), the percent of youth having sex in any six-month period increased from 28% to 61%.

**Table 3. Partial Correlation Coefficients Among Risk Behaviors at Baseline Controlling for Age, Gender, and Sensation-seeking\***

Parameter	Had sex	Tobacco	Alcohol	Marijuana	Cocaine	Other drugs	Sold drugs	Delivered drugs
Had Sex	–	0.01	–0.03	0.16	0.09	0.13	0.11	0.00
Tobacco	0.01	–	0.07	0.22†	0.26†	–0.03	0.19	0.28‡
Alcohol	–0.03	0.05	–	0.32‡	0.22†	0.25†	0.26†	0.25†
Marijuana	0.17	0.18	0.31‡	–	0.47§	–0.00	0.21*	–0.03
Cocaine	0.10	0.25†	0.21	0.46§	–	0.00	0.01	–0.01
Other drugs	0.13	–0.04	0.25†	–0.01	–0.00	–	0.49§	–0.02
Sold drugs	0.11	0.18	0.26†	0.21	0.00	0.48§	–	0.44§
Delivered drugs	0.00	0.28†	0.25†	–0.04	–0.01	–0.02	0.44§	–

\*Upper diagonal are correlations controlling for age and gender; Below diagonal are correlations controlling for age, gender, and sensation seeking.

\*p < 0.05.

†p < 0.01.

‡p < 0.001.

§p < 0.0001.

**Relationship Between Sensation-seeking and Risk Behavior Involvement**

As shown in Table 2, the mean sensation-seeking score was generally higher among youth who were involved in various risk behaviors at each of the assessment periods. Youth who used tobacco had significantly higher sensation-seeking scores than

those who did not smoke at the 12, 24, and 48 month follow-up assessments. Compared to those who did not drink, youth who consumed alcoholic beverages had significantly higher sensation-seeking scores at the 12 month and 48 month assessment periods. Similarly, youth who used marijuana had significantly higher sensation-seeking scores at 12,

**Table 4. Number (%) of Youth Engaging in Specific Drug Risk Behaviors According to Timing of Sexual Initiation (Early versus Late Initiators)\***

Interval		Tobacco	Alcohol	Marijuana	Cocaine	Other drugs	Sold drugs	Delivered drugs
Baseline	Early	16 (15)	12 (11)	4 (4)	1 (1)	1 (1)	6 (6)	3 (3)
	Late	8 (11)	7 (10)	3 (4)	1 (1)	0	1 (1)	1 (1)
6 months	Early	8 (9)	12 (13)	3 (3)	1 (1)	2 (2)	6 (7)	5 (6)
	Late	7 (12)	2 (3)‡[ns]	1 (2)	0	0	0‡[ns]	2 (3)
12 months	Early	17 (20)	16 (19)	8 (9)	0	0	4 (5)	4 (5)
	Late	4 (7)‡[ns]†	3 (6)‡[ns]	1 (2)	0	0	0	0
18 months	Early	21 (26)	24 (29)	12 (15)	2 (2)	1 (1)	10 (12)	8 (10)
	Late	6 (11)‡[‡]	7 (12)‡[‡]	3 (5)	0	1 (2)	1 (2)‡[‡]	1 (2)
24 months	Early	22 (27)	14 (17)	24 (30)	4 (5)	3 (4)	6 (7)	2 (3)
	Late	8 (16)	8 (16)	5 (10)§[ns]	0	1 (2)	0‡[ns]	0
36 months	Early	–	19 (35)	24 (44)	2 (4)	4 (7)	10 (19)	7 (13)
	Late	–	4 (12)‡[‡]	3 (9)§[¶]	1 (3)	0	0§[§]	0‡[‡]
48 months	Early	12 (26)	23 (50)	21 (46)	1 (2)	3 (7)	1 (2)	1 (2)
	Late	1 (3)§[‡]	8 (26)‡[‡]	5 (16)§[¶]	0	0	3 (10)[‡]	2 (7)

\*Early initiators-youth who initiated sex at age 12 or younger. Late initiators-youth who were age 13 or older and remained virgins at their last assessment.

†Inside [ ] represents significant levels of partial correlations controlling for gender and baseline sensation-seeking.

‡p < 0.05.

§p < 0.01.

¶p < 0.001.

\*\*p < 0.0001.

**Table 5. Relationship Between No Involvement (None), Experimentation (Once) and Repeated Involvement ( $\geq 2$ ) in Sexual and Drug-Risk Behaviors\***

	Tobacco			Alcohol			Marijuana			Cocaine		
	None	Once	$\geq 2$	None	Once	$\geq 2$	None	Once	$\geq 2$	None	Once	$\geq 2$
No sex	78%	13%	9%	71%	21%	8%	85%	10%	5%	97%	3%	0%
Once	66%	21%	14%	54%	28%	18%	63%	28%	9%	93%	7%	0%
$\geq 2$	47%	22%	31%	31%	30%	40%	35%	27%	39%	91%	9%	1%
P	0.000			0.000			0.000			0.042		

\*None = never reported participation in risk behavior; Once = reported involvement in behavior at only one assessment (experimental involvement);  $\geq$  = reported behavior at two or more assessment intervals (repeated involvement).

24, and 48 months. Scores did not differ among the few youth reporting use of cocaine and other illicit drugs compared to youth who denied use of such drugs. Youth who sold drugs had significantly higher sensation-seeking scores at baseline, and 24 months. Sensation-seeking scores were significantly higher at baseline among youth reporting “ever having had sexual intercourse” at baseline, and “having engaged in sex in the previous six months” at 12 and 24 months.

**Cross-sectional Association between Early Initiation of Sex and Drug-related Risk Behaviors**

The upper diagonal of Table 3 depicts the cross-sectional relationship among drug-use behaviors and sexual initiation at baseline, controlling for age and gender. Most substance-use behaviors are significantly

correlated, e.g., youth involved in one substance abuse behavior are likely to be involved in other behaviors. However, youth who had initiated sex at baseline and were younger than 13 years old were not more likely to be involved in drug-related risk behaviors than those who were 13 years old and never had engaged in sex.

Shown in the lower-diagonal of this table, partial correlation coefficients, controlling again for age, gender and sensation-seeking, revealed a similar pattern. These findings suggest that involvement at baseline in multiple drug-related risk behaviors cannot be explained by sensation-seeking alone.

**Longitudinal Association Between Sexual Initiation and Drug-Related Behaviors**

As seen in Table 4, tobacco-use tended to be higher among early initiators after the six months assessment period, although these differences were

**Table 6. Mean (SD) Sensation-seeking Score According to Extent of Involvement in Risk Behaviors\***

	Tobacco			Alcohol			Marijuana		
	None	Once	$\geq 2$	None	Once	$\geq 2$	None	Once	$\geq 2$
Baseline	17.28 (5.07)	20.12 (4.35)	18.78¶ (3.98)	17.44 (5.19)	18.8 (4.67)	18.67† (4.09)	17.71 (5.26)	18.53 (4.68)	18.9 (3.58)
Year One	16.31 (4.73)	18.72 (4.91)	19.18§ (4.95)	16.19 (4.93)	17.61 (4.97)	19.16‡ (4.65)	16.07 (5.10)	18.42 (4.64)	19.24§ (4.43)
Year Two	16.38 (5.10)	19.47 (4.24)	18.49§ (4.43)	15.95 (5.31)	18.33 (4.83)	18.56§ (4.26)	16.03 (5.04)	18.86 (4.60)	18.83¶ (4.69)
Year Four	16.84 (5.94)	20.70 (4.90)	19.97§ (4.41)	15.80 (6.11)	19.42 (5.0)]	20.37¶ (4.47)	16.11 (5.90)	21.19 (5.01)	20.09¶ (4.08)

\*None = never reported participation in risk behavior; Once = reported involvement in behavior at only one assessment (experimental involvement);  $\geq 2$  = reported behavior at two or more assessment intervals (repeat involvement).

†p < 0.05.  
‡p < 0.01.  
§p < 0.001.  
¶p < 0.0001.

Table 5. (Continued)

	Other Drugs			Sold Drugs			Delivered Drugs		
	None	Once	≥2	None	Once	≥2	None	Once	≥2
No sex	97%	3%	0%	95%	5%	0%	96%	3%	1%
Once	92%	7%	1%	79%	14%	7%	83%	13%	5%
≥2	89%	11%	1%	68%	17%	15%	75%	17%	8%
P		0.016			0.000			0.000	

\*None = never reported participation in risk behavior; Once = reported involvement in behavior at only one assessment (experimental involvement); ≥ = reported behavior at two or more assessment intervals (repeated involvement).

only significant at 12, 18 and 48 months of follow-up. Early initiators of sex, while equivalent at baseline, were substantially more likely in subsequent follow-up periods to use alcohol and marijuana than were late initiators. Cocaine and other drug use did not vary as a factor of timing of sexual initiation. Drug-selling was marginally more prevalent among early initiators of sex at all follow-up (*p* = 0.10) and the final assessment (*p* = 0.13). Drug-trafficking was more prevalent among early sexual initiators at the 36 month assessment.

As indicated by the significance symbols within the brackets, partial correlations controlling for sensation-seeking had only minimal effect on the association between early initiation of sex, and involvement in other risk behaviors.

### Association Between Repeated Sexual and Drug-risk Behaviors

Among the 261 youth reporting sexual experience, 171 (67%) reported sex in at least one subsequent wave (i.e., “repeated” involvement). Among those reporting tobacco use, 76 (51%) reported repeated use, 95 (48%) of alcohol-users reported repeated use, 81 (49%) of marijuana-users reported repeated use, 32 (40%) of drug-sellers reported repeated involvement, and 19 (30%) of drug-deliversers reported repeated involvement.

Table 5 depicts the relationship between repeated drug involvement with varying degrees of involvement in sexual behaviors. For all drug risk behaviors, youth with repeated involvement were

Table 6. (Continued)

	Sold Drugs			Delivered Drugs			Had Sex		
	None	Once	≥2	None	Once	≥2	None	Once	≥2
Baseline	17.68 (5.06)	20.03 (3.90)	19.42‡ (3.06)	17.93 (5.06)	18.82 (3.96)	19.67 (2.58)	16.43 (5.30)	18.92 (4.59)	18.96¶ (4.33)
Year One	16.58 (4.84)	20.43 (4.38)	20.65¶ (4.38)	16.84 (4.95)	19.87 (4.79)	20.83§ (2.79)	15.20 (5.21)	18.53 (4.40)	18.52¶ (4.65)
Year Two	16.94 (5.08)	18.07 (4.56)	20.32‡ (3.43)	16.91 (5.01)	19.28 (4.85)	20.07‡ (3.56)	14.97 (5.01)	17.39 (4.68)	18.72¶ (4.68)
Year Four	17.55 (5.88)	20.86 (4.54)	21.00‡ (2.80)	17.68 (5.72)	21.05 (5.05)	21.33† (2.29)	15.23 (5.78)	20.37 (3.85)	19.15§ (5.49)

\*None = never reported participation in risk behavior; Once = reported involvement in behavior at only one assessment (experimental involvement); ≥2 = reported behavior at two or more assessment intervals (repeat involvement).

†*p* < 0.05.

‡*p* < 0.01.

§*p* < 0.001.

¶*p* < 0.0001.

significantly more likely to report “repeated” sex (i.e., sexual intercourse in 2 or more assessment periods) than they were to report experimental sex and/or no sex. Likewise, the converse was also true; virgins were significantly more likely to report no involvement in the drug-risk behaviors than were youth who had reported having engaged in sex either in one assessment period or in two or more assessment periods. These general patterns did not differ by gender or by age in separate analyses for males and females and among youth 11 years of age and younger and 12 years of age and older. (Data available upon request from the authors.)

### **Association Between Extent of Risk Involvement and Propensity Towards Sensation-seeking**

Table 6 depicts the mean sensation-seeking scores of youth ranging from no involvement in a drug-related risk behavior to repeated involvement in the behavior. Sensation-seeking scores were significantly higher among youth with experimental and/or repeated involvement in any risk behavior than among youth reporting no involvement in a particular risk behavior over the four assessment periods. The sensation-seeking scores did not differ significantly among youth reporting repeated versus experimental involvement in the risk behaviors.

## **DISCUSSION**

Consistent with the literature,<sup>17,25</sup> these data support an association between advancing age and increased involvement in sex and several drug-related risk behaviors. Over the four-year study interval, marijuana-use, in particular, increased, with one-twentieth of the youth reporting involvement at baseline and nearly one-half at the final assessment interval.

Sensation-seeking scores were higher after the baseline assessment among youth reporting tobacco, alcohol, and marijuana use and were higher both at baseline and through several follow-up assessments among youth reporting drug-selling and sex.

At baseline, the correlations among drug-related risk behaviors were all strong, while early initiators of sex did not exhibit drug-risk involvement at baseline. Controlling for sensation-seeking did not alter these relationships. However, over time, they were more likely to report involvement in substance use

and drug-delivery and sales than were late initiators. Controlling for sensation-seeking weakened the association between early initiation of sex with drug-selling, but not with the other drug-related risk behaviors. Consistent with other studies,<sup>6</sup> reports of repeated involvement in drug-related activities was correlated with more sustained sexual involvement. Sensation-seeking scores were lower among youth reporting no involvement in risk behaviors; however, scores did not differ between youth exhibiting experimental behavior compared to youth demonstrating repeated risk involvement.

### **Limitations**

These data are based on self-reported behavior. Nevertheless, as we have reported previously, given the consistency of reporting of risk behaviors over time and the association of risk perceptions and risk behaviors,<sup>26</sup> we believe that the self-reports are relatively accurate. The youth selected for participation in this study were selected on the basis of convenience rather than from random sampling and thus may or may not be representative of the community at large. However, we believe that they are probably representative since the distribution of risk behaviors in this sample are consistent with those found in other samples of youth taken from similar surroundings.<sup>14,24</sup> The lack of association between some of the risk behaviors (e.g., use of cocaine and other illicit drugs) at a given point of time may reflect the low prevalence of such behaviors in a relatively small sample rather than a true lack of association. Definitions of “repeated” and “experimental” are arbitrary, although the associations, as hypothesized, were extremely robust over time and across risk behaviors, suggesting that the definitions employed were at least capturing the spirit of repetitive behavior and experimental behavior. Finally, because these data were collected as part of a larger study assessing the impact of an HIV-risk reduction intervention and were not obtained to answer the questions posed in the current study, the results should be regarded as hypothesis-generating rather than hypothesis-testing.

### **Implications of the Findings**

The sharp increase in several risk behaviors as this cohort aged over four years from a baseline median age of 11 years underscores the need for early sexual and drug risk prevention programs—



even at an age when most youth are not yet engaging in risk activities.

These findings, if replicated in other studies, would also suggest the possibility that youth with higher sensation-seeking scores might be at particular risk, both for experimental risk behaviors and, of greater concern, sustained involvement. Whether these youth would benefit more from specific risk reduction programs or from the provision of alternative, less destructive, activities that might satisfy their intrinsically higher need for excitement is open to speculation and further investigation. Most probably, the data provide evidence for a need for both risk reduction programs *and* alternative activities, especially for youth living in resource-depleted areas. Clearly resolution of these issues is of great public health significance.

Given the complex and contradictory findings in the current literature regarding the association of sexual risk and drug-risk behaviors, it is not surprising that no single theme in this regard has emerged from our data. The baseline cross-sectional data in this study are consistent with the correlation coefficients reported by the authors in 1993 with regard to early initiation of sex and tobacco, alcohol, and marijuana in a different, smaller cross-sectional study.<sup>14</sup> To validate this consistency, additional analyses were conducted with the criteria used in 1993 study (i.e., sexually experienced versus virgins at baseline); the results of the present data virtually replicate the findings of 1993 (data available from the authors upon request). The findings in the current study are also consistent with those reported regarding a sample of Midwestern, urban youth followed three decades ago.<sup>12</sup> Over time, however, early sexual initiators became more likely to become involved in these risk behaviors. In spite of the association between sensation-seeking and involvement in risk behavior, controlling for sensation-seeking did not significantly weaken these associations with the exception of drug-selling. Similar findings have been reported by others. Dolezal et al.,<sup>3</sup> for example, noted in their study population of adults that significant associations between drug-use and high risk sexual behavior remained after controlling for sensation-seeking, thus suggesting that sensation-seeking may explain some, but not all, of the association.

The clear relationship between increasing involvement in sex and increasing involvement in drug-related risk activities suggests the need for in-

terventions that will specifically address experimental behavior as well as repeated risk behavior. Substantial adolescent literature underscores the importance of recognizing that many youth will experiment with risk behavior and that only some of them will adopt these behaviors.<sup>27</sup> As important as designing interventions to postpone or avoid any involvement in risk behaviors among adolescents is the need to identify strategies to increase the likelihood of rejecting behaviors even if they have been tried.

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