

Early Adolescents' Cognitive Susceptibility To Initiating Sexual Intercourse

CONTEXT: Better methods for investigating sexual risk before the initiation of sexual intercourse are needed to support programming for younger adolescents, especially for abstinent adolescents who are susceptible to initiating intercourse.

METHODS: A sample of 854 adolescents in seventh or eighth grade who had never had sexual intercourse completed sexuality surveys in 2002 and 2004. A five-item index that assessed beliefs and expectations about the onset of intercourse was created to indicate adolescents' cognitive susceptibility to initiating intercourse. Logistic regression analysis was used to assess associations between levels of susceptibility and initiation of intercourse by follow-up. The construct and predictive validity of the index were examined using a variety of tests.

RESULTS: Thirty-eight percent of respondents were classified as being nonsusceptible to initiating intercourse, 34% as having low susceptibility and 28% as being highly susceptible. Adolescents who were susceptible were more physically mature, had greater sexual feelings and competency, perceived that more peers were sexually active and had fewer positive connections with parents, school and religion than nonsusceptible respondents. Males, blacks and older adolescents were more susceptible than females, whites and younger adolescents, respectively. Compared with nonsusceptible respondents, those with low and high susceptibility had higher odds of initiating intercourse two years later (odds ratios, 2.5 and 8.1, respectively).

CONCLUSIONS: The cognitive susceptibility index provides a valid method for assessing sexual risk before the onset of intercourse. Assessing susceptibility among early adolescents could support efforts to delay the onset of intercourse through targeted research and health programming.

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Delaying the onset of sexual intercourse is the primary prevention goal of most sexual health programs for teenagers, especially those focusing on abstinence education. Programs are most effective among adolescents who have not yet initiated intercourse, and it is difficult to persuade adolescents who have initiated coitus to discontinue having intercourse.¹ The majority of 12–14-year-olds have not had intercourse, but the proportion who have done so, especially among females, is rising.² Supporting sexual abstinence for younger adolescents is essential, because those who engage in intercourse before they are 16 are less likely to use contraceptives and more likely to contract STDs and become teenage parents than are older adolescents.³

Despite the importance of delaying first coitus, research on sexual development has focused on documenting the major shift from abstinence to first coitus.⁴ The prevailing model of sexual behavior classifies adolescents as sexually active if they report having ever had intercourse and as sexually inactive, or abstinent, if they have not, since the coital act is what places them at risk for unintended pregnancy and STDs. In this model, abstinent adolescents are regarded as homogeneous, and because they have not had intercourse, they are excluded from assessments of sexual risk and behavior. As a result, research has improved our understanding

of the factors related to coitus, but we still have limited insight into the sexual risks preceding intercourse.

Yet risks for engaging in intercourse may vary among sexually abstinent teenagers. The premise of this study is that some abstinent adolescents are cognitively susceptible to initiating intercourse: They feel ready for the onset of intercourse and have high expectations that it will occur. Susceptible adolescents have a higher level of sexual risk than those who are committed to maintaining abstinence.

Sexual health programs that aim to prolong abstinence need to be based on a thorough understanding of sexually abstinent teenagers, especially those who are susceptible to initiating intercourse. Although some research has been conducted on this topic, it has been limited by insufficient measurement of sexual risk and generally has not focused on younger adolescents. Further research with younger adolescents and better methods for delineating their sexual risk are needed to improve the design and effectiveness of primary prevention programs.

COGNITIVE SUSCEPTIBILITY

The notion of cognitive susceptibility was originally used in research that examined the steps and factors involved in adolescents' taking up cigarette smoking.⁵ Susceptibility to

smoking is identified by psychological and situational components that indicate nonsmokers' cognitive predisposition or readiness to smoke. Cognitive susceptibility is part of the preparation stage and is a marker of which adolescents are likely to take up smoking. Adolescents' cognitive susceptibility to alcohol use has also been investigated.⁶ Adolescents' susceptibility to initiating sexual intercourse, however, has not been similarly assessed.

The few research programs that have characterized adolescents regarding their likelihood of initiating sexual intercourse have been limited by measurement protocols. For example, in a longitudinal study of high school and college students' health behaviors,⁷ Jessor and Jessor described a pattern of personality, perceived environment and behavioral attributes assumed to indicate "transition-proneness," or adolescents' readiness to engage in deviant behaviors. Identification of "transition-prone" individuals was based on a data-intensive set of more than 20 variables and scales that documented greater orientation toward peers than parents, lower religious participation and academic achievement, and more tolerance of deviance for oneself and one's friends. Transition-proneness was conceptualized as a global developmental attribute rather than a domain-specific attribute, and transition-prone adolescents were likely to initiate sexual intercourse, marijuana use and problem drinking. A more concise method for identifying adolescents' specific likelihood of initiating intercourse would be useful for research and intervention purposes.

A more recent line of research has described sexually abstinent adolescents from their response to a single question about the likelihood of initiating coitus in the next year. Miller and colleagues⁸ divided abstinent high school students into two groups: "Delayers" reported that they were unlikely to initiate sexual intercourse in the next year and had limited sexual experience, whereas "anticipators" reported that they were unsure or likely to initiate intercourse and had significant precoital sexual experience. Compared with delayers, anticipators reported riskier peer behaviors and less attachment to family, school and church. In another study, anticipators were more approving of premarital sex, reported less parental monitoring, were less influenced by parents and perceived more peer sexual behavior than delayers.⁹

It is difficult to measure a concept using a single indicator, because one question rarely captures the full meaning of a concept.¹⁰ Therefore, relying on a single indicator to assess the risk of initiating sexual intercourse may result in inadequate sensitivity and specificity for correctly classifying adolescents on the basis of their likelihood of engaging in intercourse. The inaccurate assignment of sexually abstinent adolescents into different sexual risk groups would diminish both the ability to conduct valid research and the effectiveness of intervening with targeted groups.

PRESENT STUDY

We present a new measure of sexual risk for abstinent adolescents that is defined by their cognitive susceptibility to initiating sexual intercourse. Being susceptible does not nec-

essarily indicate that an adolescent has firm plans to engage in the behavior, but that, if the opportunity presents itself, the adolescent is more likely to participate. Researchers have distinguished between intention, which indicates a plan to take action, and expectation, which reflects the perceived likelihood of taking action and is considered a better predictor of behavior.¹¹ Behavioral expectations are more complex than intentions, in that an individual may not intend to engage in a given behavior, but under certain conditions may expect to.¹² Because adolescents' beliefs and expectations regarding the onset of sexual intercourse under various conditions contribute to their likelihood of initiating intercourse, our susceptibility measure distinguishes levels of risk among sexually abstinent adolescents.

We believe that this measure will facilitate more targeted research and health programming for abstinent but at-risk adolescents. Our measure is more easily assessed than transition-proneness, it yields discrete categories of adolescents by hypothesized vulnerability to participating in risk behavior and it is specific to sexual behavior. Furthermore, because it uses multiple items, it should be a more valid indicator than single-item measures of teenagers' likelihood of initiating sexual intercourse in the near future, and should significantly improve our ability to accurately classify, and thus investigate and understand, their readiness for coitus.

Construct validity is measured by the extent to which hypotheses—suggested by theory and prior research about the relationship between a target construct and other possible constructs—are supported by data. We assessed the construct validity of our measure by testing hypothesized relationships between cognitive susceptibility and characteristics of the self and the social context. On the basis of previous research, we hypothesized that more susceptible adolescents would report fewer positive connections to parents, school and religion, and more peer models for sexual behavior, than would less susceptible adolescents. Adolescents who were more susceptible were also expected to report increased readiness for initiating sexual intercourse, including greater physical maturity, stronger sexual feelings, more confidence about having sexual relationships and greater sensation-seeking, compared with less susceptible adolescents.

To further explore construct validity, we examined differences in susceptibility among adolescents from different demographic subgroups. We expected that males, black adolescents and older teenagers would have higher susceptibility scores because they tend to initiate sexual intercourse earlier than do females, white adolescents and younger teenagers, respectively.¹³

Predictive validity is assessed by how well a measure predicts a future outcome. To evaluate this, we tested whether cognitive susceptibility at baseline predicted the onset of sexual intercourse two years later. We expected the multi-item susceptibility measure to do a better job than a single indicator of identifying adolescents who would initiate sexual intercourse by follow-up.

METHODS

Recruitment and Procedure

All 16 public middle schools in three school districts in the southeastern United States were invited to participate in a two-phase study of seventh and eighth graders' media use and sexual behavior. Fourteen schools agreed to participate, making this a nonprobability sample. These schools enrolled urban, suburban and rural populations, and approximately equal proportions of blacks and whites, as well as of males and females. All 6,234 seventh- and eighth- grade students enrolled in these schools were eligible to participate in the first-phase study of media use. In fall 2001, brief informational sessions inviting students to complete a media use questionnaire were held at each school. Eighty-one percent of enrolled students provided usable contact information and were mailed a media questionnaire and a parental consent form, and 65% of these returned the completed questionnaire and consent. White females were slightly over-represented among respondents (26% in the sample vs. 22% in the student body), and black males were slightly under-represented (18% vs. 22%).

Of the 3,261 respondents who returned the questionnaire, 1,200 were randomly selected to complete the second-phase audio computer-assisted self-interview (audio-CASI) sexuality survey. A stratified sample was chosen to include equal numbers of black and white students, and of males and females. In spring and summer 2002, 90% of these students (1,074) completed baseline surveys in their homes. Two years later, in spring 2004, 95% of this baseline sample (1,017) completed a follow-up in-home audio-CASI survey. Of the 57 respondents lost to follow-up, six refused to participate, seven did not get parental consent and 44 had moved out of the study area. There were no age, race, gender or sexual behavior differences between respondents who completed the follow-up survey and those who did not.

Of the respondents with longitudinal data, 129 reported having had sexual intercourse at baseline. An additional 26 adolescents did not indicate whether they had initiated intercourse at baseline, and eight did not say whether they had had intercourse by follow-up. Therefore, 854 respondents (80% of the sample) who had not engaged in sexual intercourse at baseline and had complete longitudinal data formed the sample for the present study.

Before each 45-minute survey was administered at baseline and follow-up, the parent or guardian provided written consent and the adolescent provided signed assent. The audio-CASI system allowed adolescents to use a laptop computer to listen to survey questions through earphones and then touch the screen to respond. A trained interviewer set up the computer and was available to answer questions if needed. Audio-CASI was chosen for data collection because it elicits more candid responses than face-to-face interviews with adolescents about sensitive topics such as sexuality and drug use.¹⁴ Respondents were given \$20 upon completion of each interview. The protocols and measures used in this study were reviewed and approved by the institutional review board of the University of North Carolina.

Measurement

•*Instrument development.* The items and scales used in this study have been documented to be reliable and valid with other samples of adolescents. To test the comprehensibility and relevance of the items and scales for our sample, two focus groups were conducted with seventh graders from one school in each of the three participating school districts, for a total of six focus groups. Students were asked to provide written responses to a series of questions, and then the groups discussed the series as a whole. Items that were too mature for this age-group were either eliminated, revised to reflect dating and sexual situations relevant to our sample, or rewritten to refer to peers' sexual behavior instead of one's own.

•*Cognitive susceptibility.* Five items assessed cognitive susceptibility at baseline. The first two, "How likely is it that you will have sex in the next year?" and "How likely is it that you will have sex while you are in high school?," were scored from 1 (very unlikely) to 4 (very likely).¹⁵ The third item, "If you had a boyfriend/girlfriend, how sure are you that you could refuse to have sex with him/her if you didn't feel ready?," was scored from 1 (extremely sure) to 5 (not at all sure).¹⁶ The fourth item, "I think I'm ready to have sex,"¹⁷ and the fifth item, "I believe it is OK for people to have sex before marriage if they are in love,"¹⁸ were scored from 1 (strongly disagree) to 5 (strongly agree).

Following the protocol used by Pierce and colleagues, susceptibility was indicated by lack of a firm commitment not to engage in risk behavior.¹⁹ Responses to each of the five items were dichotomized to indicate whether the respondent was susceptible or not. A response of 3 or higher was considered to demonstrate susceptibility.

The items indicating susceptibility were then summed to form a total susceptibility score ranging from 0 to 5 (Cronbach's alpha=0.77). Respondents were classified as being nonsusceptible if they reported no indicators of susceptibility, having low susceptibility if they reported one or two indicators, and being highly susceptible if they reported three or more. This classification was guided by the assumption that some adolescents are not at all susceptible to initiating sexual intercourse during adolescence and are firmly committed to postponing first coitus,²⁰ while others are highly susceptible and likely to initiate coitus when they are teenagers.²¹

•*Construct validity.* The measures used to test construct validity hypotheses were assessed at baseline, and were scored so that higher values corresponded to increasing levels of the construct.

Parent closeness was assessed with one item for mothers and one item for fathers: "How would you describe your relationship with your mother or female guardian/father or male guardian?" Response options ranged from 1 (poor) to 5 (excellent). Parental monitoring was assessed by the number of "hands-on" activities (ranging from one to eight) that parents performed in different areas of an adolescent's life, such as setting a weekend curfew, eating dinner with the adolescent and restricting CD purchases.²²

Adolescents' connections to school were assessed with

TABLE 1. Percentage distribution of middle school students participating in a longitudinal sexuality survey, by selected baseline characteristics, southeastern United States, 2002–2004

Characteristic	Total sample (N=1,017)	Analysis sample† (N=854)
Age		
12	18.4	20.1
13	46.2	48.1
14–15‡	34.3	30.8
Missing	1.1	0.9
Gender		
Female	49.6	52.1
Male	50.4	47.9
Race		
White	48.3	53.7
Black	51.7	46.3
Grade		
7	52.2	53.4
8	47.8	46.6
Socioeconomic status§		
Low	31.4	27.0
High	68.0	72.2
Missing	0.6	0.7
Household structure		
Two parents	67.3	69.6
Other	32.7	30.4
Parental education††		
Some high school	4.3	3.5
High school graduate	15.6	14.9
Some college	12.8	11.8
College graduate	29.6	30.1
>college	27.3	30.3
Don't know	10.3	9.4
Susceptibility to initiating intercourse		
None	na	38.2
Low	na	34.0
High	na	27.8
Total	100.0	100.0

†Includes respondents who completed both baseline and follow-up surveys and who had not engaged in sexual intercourse at baseline. ‡At baseline, the total sample included 31 adolescents aged 15, and the analysis sample included 22 adolescents of this age. §Respondents who reported receiving free or reduced-price breakfast or lunch at school were categorized as having low socioeconomic status. ††Highest education level attained by either parent. Notes: Percentages may not total 100.0 because of rounding. na=not applicable.

three questions from the National Longitudinal Study of Adolescent Health:²³ “How happy are you to be at your school?”; “How much do you feel that your teachers care about you?”; and “Since school started this year, how often have you had trouble getting along with your teachers?” The first two items were scored from 1 (not at all) to 5 (extremely), and the third was scored from 1 (every day) to 5 (never). Responses were summed and averaged to create a connectedness score (Cronbach’s alpha=0.60). School expectations were assessed with two items: “What do you think are the chances that you will graduate from high school?” and “What do you think are the chances that you will go to college?” Responses, scored from 1 to 5, were no chance, some chance, about 50/50, pretty likely and it will definitely

happen. These two items were summed and averaged to create an expectations score (Cronbach’s alpha=0.72). Grades on the last report card were measured on a scale from 1 (mostly D’s) to 7 (mostly A’s).

Religious attitudes were measured using three items from the Intrinsic Religious Motivation Scale,²⁴ which were scored on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree): “My religious faith sometimes restricts my actions”; “Nothing is as important to me as serving God as best I know how”; and “There are more important things in life than religion” (reverse-scored). These items were summed and averaged to create a religious attitudes score (Cronbach’s alpha=0.73). Religious attendance was measured from 1 (never attends religious services) to 5 (attends services four or more times a month).

Perceived peer sexual behavior was measured with a single question: “How many of your friends do you think have had sex?” Responses were scored from 1 to 4 as none, just a few, some or most.

Physical maturity was assessed with the following item: “Do you think that your body development is earlier or later than most other girls/boys your age?” Responses ranged from 1 (much later) to 5 (much earlier). Sexual desire was assessed with three items: “I think that sex is disgusting” (reverse-scored); “There are things about sex I want to try”; and “If a guy/girl were to kiss me, my body would feel good.”²⁵ Four items were used to measure sexual appeal and competency: “Flirting is fun and I am good at it”; “I know how to get a guy/girl to like me”; “I believe that guys/girls generally consider me attractive”; and “Sometimes I dress sexy or wear fashionable clothing or shoes to get attention from guys/girls.”²⁶ The sexual desire and sexual appeal items were measured on a scale from 1 (strongly disagree) to 5 (strongly agree), and responses were summed and averaged to create scores (Cronbach’s alpha=0.76 and 0.72, respectively).

Sensation-seeking was measured by five items that combined assessments of impulsivity²⁷ and sensation-seeking.²⁸ “I like new and exciting experiences, even if I have to break the rules”; “I like to do scary things”; “I do whatever is the most fun”; “I do whatever feels good”; and “I like friends who are exciting and unpredictable.” Responses were scored from 1 (strongly disagree) to 5 (strongly agree), and were summed and averaged (Cronbach’s alpha=0.63).

•**Sexual intercourse.** At both baseline and follow-up, adolescents were asked: “Have you ever had sex, that is, when a guy puts his penis into a girl’s vagina?” Respondents could answer by touching “had sex” on the computer screen, and were then provided with the following description: “When we say ‘having sex,’ we mean when a guy puts his penis into a girl’s vagina. This can also be called ‘going all the way’ or ‘doing it.’”

•**Demographic characteristics.** Baseline data were collected on respondents’ age, gender, race and grade level. Socioeconomic status was determined by a single dichotomous measure: “Do you receive a free or reduced-price breakfast or lunch at school?” Household structure was defined as living either with two parents (biological or step) or in some

other arrangement, and parental education was determined by the highest education level attained by either parent.

Statistical Analysis

We assessed construct validity through internal structure analysis, tests of relationships with variables that were hypothesized to be related to susceptibility and documentation of group differences on the susceptibility measure.²⁹

For the internal structure analysis, the five dichotomized items forming the susceptibility index were submitted to a principal components factor analysis with varimax rotation.³⁰ We expected that all items would load on one factor, thus demonstrating that the items are tapping a one-dimensional construct.

Relationships between the three-level susceptibility measure and variables that were hypothesized to be related to susceptibility were tested using analysis of covariance. We calculated means for each susceptibility group, and conducted F tests for each analysis while controlling for age, gender and race.

The final construct validity analyses concerned differences in susceptibility between groups known to initiate sexual intercourse at different rates. These analyses used chi-square tests and compared males versus females, blacks versus whites and younger versus older adolescents.

To assess the predictive validity of the cognitive susceptibility measure, logistic regression was used to test whether low and high susceptibility at baseline predicted elevated odds of initiating sexual intercourse two years later compared with no susceptibility, after controlling for age, gender and race. Additionally, the multi-item measure of susceptibility was compared with the single item assessing the perceived likelihood of initiating sexual intercourse in the next year. Both measures were dichotomized: Adolescents who reported one or more indicators of susceptibility were compared with those who reported none, and adolescents who said they were likely to initiate intercourse in the next year were compared with those who said they were unlikely to do so.

The sensitivity and specificity of these different measures were then evaluated. Sensitivity is the probability of being classified as susceptible or likely to initiate coitus among adolescents who initiated intercourse by follow-up. Specificity is the likelihood of being classified as nonsusceptible or unlikely to initiate coitus among those who remained abstinent at follow-up. Sensitivity of a measure is more important than specificity when the health implications of missing a case are serious.³¹ That is, it is more important to identify adolescents who will initiate sexual intercourse than to identify adolescents who will remain abstinent, because the initiation of intercourse places adolescents at increased risk for adverse health outcomes.

RESULTS

The mean age of the analysis sample was 13.7 years (range, 12–15) at baseline. The sample was about evenly split between females and males, whites and blacks, and seventh and eighth graders (Table 1). One-fourth of respondents

TABLE 2. Means (and standard deviations) of measures of adolescents' selected characteristics, by level of susceptibility to initiating sexual intercourse

Characteristic	None	Low	High	F†
Closeness with mother	4.36 (0.85)	4.24 (0.96)	4.01 (1.07)‡,§	11.5***
Closeness with father	3.92 (1.14)§	3.62 (1.33)‡	3.59 (1.29)‡	5.9**
Parental monitoring	5.50 (1.48)§	4.70 (1.53)‡	4.28 (1.58)‡,§	40.8***
School connectedness	4.06 (0.60)§	3.88 (0.61)‡	3.68 (0.73)‡,§	20.4***
School expectations	4.82 (0.38)§	4.62 (0.64)‡	4.46 (0.68)‡,§	17.5***
Grades	5.77 (1.32)§	5.21 (1.61)‡	4.76 (1.56)‡,§	16.7***
Religious attitudes	3.64 (1.04)§	3.39 (0.98)‡	3.37 (1.00)‡	9.7***
Religious attendance	3.94 (1.39)§	3.60 (1.53)‡	3.44 (1.50)‡	12.4***
Peer sexual behavior	1.42 (0.63)§	1.70 (0.77)‡	2.23 (0.93)‡,§	55.9***
Physical maturity	2.87 (0.85)	2.93 (0.86)	3.12 (1.02)‡,§	5.7**
Sexual desire	2.95 (0.86)§	3.47 (0.78)‡	4.09 (0.66)‡,§	106.0***
Sexual appeal	3.03 (0.84)§	3.22 (0.77)‡	3.69 (0.71)‡,§	39.7***
Sensation-seeking	2.70 (0.59)§	2.90 (0.59)‡	3.16 (0.62)‡,§	28.8***

p<.01. *p<.001. †F tests controlled for age, gender and race. ‡Significantly different from the no-susceptibility group at p<.05. §Significantly different from the low-susceptibility group at p<.05. Notes: All measures were scored so that higher values indicated greater levels of the characteristic. They were scored on a scale of 1–5, except for parental monitoring (1–8), grades (1–7) and peer sexual behavior (1–4).

received free or reduced-price meals at school (indicating low socioeconomic status), two-thirds lived with both parents and more than half had a parent with a college degree.

Thirty-eight percent of adolescents were classified as non-susceptible to initiating sexual intercourse because they reported no indicators of susceptibility; 34% exhibited low susceptibility by reporting one or two indicators; and 28% exhibited high susceptibility by reporting 3–5 indicators. At baseline, 17% of the study sample said they were likely to have intercourse in the next year, and by follow-up, 23% of the sample reported having initiated intercourse (not shown).

Construct Validity

Factor analysis of the five dichotomized items that formed the susceptibility measure yielded one factor with an eigenvalue greater than 1, demonstrating that the items are measuring only one construct. (The factor structure could not be rotated because all five items loaded on one factor.) The eigenvalue for the single factor was 2.66 and accounted for 53% of the variance in the factor. Factor loadings for the five items were high, ranging from .639 for perceived ability to maintain abstinence to .804 for perceived likelihood of having intercourse while in high school.

We expected that susceptible adolescents would be less attached to socializing forces that advocate conservative behavior (i.e., parents, school and religion) and therefore less likely to internalize attitudes and beliefs that support maintaining sexual abstinence. We also expected that adolescents who perceived that their peers were engaging in sexual intercourse would be more cognitively predisposed to participate in behavior that was viewed as acceptable by these peers. The data support these hypotheses: Compared with adolescents who were not susceptible, those who were susceptible were less close with their mothers and fathers, reported fewer exercises of parental monitoring, were less connected to their schools, had lower school expectations and lower grades, placed less importance on religion and attended religious services less frequently (Table 2). Suscep-

TABLE 3. Percentage distribution of adolescents, by level of susceptibility to initiating sexual intercourse, according to selected characteristics

Characteristic	None	Low	High	Total
Gender				
Female	48.8	37.0	14.2	100.0
Male	26.9	30.6	42.5	100.0
$\chi^2=91.2^{***}$				
Race				
White	43.6	34.6	21.8	100.0
Black	32.1	33.2	34.7	100.0
$\chi^2=20.1^{***}$				
Age				
12	48.5	32.9	18.6	100.0
13	39.0	33.9	27.1	100.0
14–15	31.6	34.2	34.2	100.0
$\chi^2=16.9^{**}$				

p<.01. *p<.001.

tible adolescents also perceived that more friends were having sexual intercourse.

Our next hypothesis predicted that susceptible adolescents would exhibit personal attributes that signify increased readiness for the onset of intercourse. Adolescents who were susceptible and so closer to initiating sexual intercourse should have reported stronger sexual feelings and increased confidence for having romantic relationships. We also expected that sensation-seeking would influence how adolescents view their sexual behavior, in that adolescents who are impulsive and desire new experiences would be more cognitively predisposed to engage in novel and arousing behaviors, such as intercourse. The results supported these hypotheses as well, showing that susceptibility was related to greater physical maturity, greater feelings of sexual desire, belief in having more sexual appeal and competency, and increased sensation-seeking.

Our final construct validity hypothesis predicted that adolescents within demographic subgroups that are known to report an earlier age at first intercourse would report greater susceptibility than would adolescents from other subgroups. As expected, male adolescents were more susceptible than female adolescents; 43% of males were classified as highly susceptible, compared with 14% of females (Table 3). Furthermore, 35% of blacks were highly susceptible, compared with 22% of whites; and 34% of 14–15-year-olds were highly susceptible, compared with 27% of 13-year-olds and 19% of 12-year-olds.

TABLE 4. Percentage of adolescents who initiated intercourse between baseline and follow-up, by level of susceptibility; and odds ratios (and 95% confidence intervals) from logistic regression analysis assessing associations between susceptibility and initiation

Susceptibility	%	Odds ratio†
None	9.8	ref
Low	21.7	2.48 (1.54–4.00)
High	42.6	8.13 (4.90–13.47)

†Adjusted for age, gender and race. Note: ref=reference group.

Predictive Validity

Among nonsusceptible adolescents, only 10% reported initiating intercourse by follow-up, whereas 22% of adolescents with low susceptibility and 43% of highly susceptible adolescents reported intercourse at follow-up (Table 4). Compared with nonsusceptible adolescents, respondents in the low-susceptibility and high-susceptibility groups were more likely to have initiated intercourse by follow-up (odds ratios, 2.5 and 8.1, respectively), after age, gender and race were accounted for.

Our final assessment of predictive validity compared the sensitivity and specificity of the multi-item susceptibility index with the sensitivity and specificity of the single item measuring perceived likelihood of initiating intercourse in the next year. Adolescents who initiated intercourse by follow-up were highly likely to have been classified as susceptible at baseline (84% sensitivity; 164 susceptible respondents out of 196 initiators), but were much less likely to have perceived that they would initiate sexual intercourse in the next year (37% sensitivity; 72 perceived as likely out of 194 initiators). In contrast, adolescents who were still abstinent at follow-up were highly likely to have perceived themselves as unlikely to initiate coitus (90% specificity; 581 perceived as unlikely out of 648 remaining abstinent), but were much less likely to have been classified as nonsusceptible (45% specificity; 295 nonsusceptible out of 658 remaining abstinent).* Therefore, our multi-item susceptibility index demonstrated better sensitivity but lower specificity than the single-item measure. In other words, it performed well at identifying adolescents who initiated sexual intercourse by follow-up, but not at identifying adolescents who remained sexually abstinent.

DISCUSSION

The cognitive susceptibility index presented in this study provides a new method for assessing early adolescents' risk of initiating sexual intercourse. Analyses of the psychometric properties of this index provide evidence for its construct and predictive validity in a longitudinal sample of pre-coital 12–15-year-old black and white adolescents. This measure is valuable for identifying pre-coital early adolescents who will initiate sexual intercourse by middle adolescence.

We found that adolescents who were cognitively susceptible to initiating intercourse could be distinguished from other abstinent teenagers on the basis of their advanced physical maturity, increased feelings of sexual desire, greater confidence for having sexual relationships and perceptions that more of their peers were sexually active. Susceptible adolescents also had fewer positive connections with their parents, school and church, and these findings substantiate conclusions reached by other investigators.³² It is noteworthy that adolescents exhibited these biological, psychological and social differences associated with sexual behavior even before they initiated intercourse; among ado-

*These analyses were also conducted by comparing adolescents who reported three or more indicators of susceptibility with adolescents who reported fewer, yielding a sensitivity of 52% and a specificity of 79%.

lescents of varying susceptibility, we found consistent and substantial differences in the hypothesized variables. Because many of the seventh and eighth graders in the sample were highly susceptible to initiating sexual intercourse, primary prevention programs need to reach adolescents before they enter middle school.

Susceptible adolescents initiated sexual intercourse at higher rates than did nonsusceptible adolescents, demonstrating that our cognitive susceptibility index could be used to predict the sexual behavior of early adolescents. It is noteworthy that beliefs and expectations in early adolescence, when youth are on the cusp of abstract and hypothetical reasoning, predicted behavior in middle adolescence. Leading theories of behavioral science (e.g., theory of reasoned action, health belief model) address the link between attitudes and behavior, and our results provide support for this connection even among early adolescents. A positive association between sexual intentions and future sexual behavior has also been confirmed in a six-month study of 9–15-year-old urban black adolescents,³³ in a one-year study of predominantly white 15–19-year-old males³⁴ and in a yearlong study of racially diverse high school students.³⁵ Our findings document similar results over a longer time period in a large group of racially diverse early adolescents.

Almost four in 10 seventh and eighth graders were classified as nonsusceptible, and two years later only 10% of this group had initiated coitus. A combination of less physical maturity (compared with levels among their more susceptible peers) and stronger connections to parents, school and religion seems to have protected these adolescents from advanced sexual behavior in middle adolescence.

Forste and Haas concluded that the 15–19-year-old men in their study who had low expectations for initiating sexual intercourse had made a firm decision to delay coitus.³⁶ For nonsusceptible adolescents in the present study, strong attachments to conventional socialization agents may remain protective against the initiation of sexual intercourse well into the future, thus providing support for the Forste and Haas position. Alternatively, nonsusceptible adolescents may initially be developmentally behind their peers but adopt the same sexual behaviors later in adolescence. Pubertal development exerts a powerful influence on adolescents' sexuality, yet social factors also have a prominent role in influencing teenagers' behavior.³⁷ Further longitudinal research is needed on the characteristics of sexually abstinent adolescents before we can more fully understand the processes that affect the development of sexual behavior and lead to the postponement of sexual intercourse.

Our findings have several implications for intervention programming and research. First, subgroups of preadolescent adolescents require different types of sexual health messages and interventions. Adolescents who are committed to delaying sexual intercourse are likely to respond positively to messages that reinforce their postponement of sexual initiation. However, adolescents who are susceptible to initiating intercourse in the near future may ignore abstinence messages because they may feel that having sex is immi-

nent and unavoidable.³⁸ Second, a better understanding of susceptible adolescents would facilitate effective intervention at a critical juncture in their development of risk behavior. Susceptible adolescents need support for remaining abstinent, and they may need more information about condoms and other contraceptives, as well as enhanced safer-sex negotiation skills, if they initiate sexual intercourse.³⁹ Third, the cognitive susceptibility index offers an additional outcome variable to examine when conducting adolescent sexual behavior research and testing intervention effects. Since primary prevention is especially appropriate for youth who are susceptible to initiating intercourse, the ability to classify susceptible adolescents and distinguish them from less susceptible peers, and to track their level of sexual risk over time, would be very helpful in intervention efforts.

Limitations

Our data have several limitations that may restrict the generalizability of the findings. The initial media study sample was not selected at random, but was drawn from students in three school districts, and only adolescents who identified themselves as black or white were eligible for participation. There was a slight selection bias in the media sample, but there was no detectable attrition bias in the longitudinal sample. Furthermore, adolescents who reported having had sexual intercourse in seventh or eighth grade were excluded from these analyses; therefore, the results may not apply to the earliest initiators, who are the most likely to experience negative health outcomes. In addition, fewer seventh and eighth graders reported sexual intercourse in the total sample than was expected from national estimates, although the total proportion of adolescents reporting intercourse in ninth and 10th grade did approximate national estimates.⁴⁰ A more extensive description of the strengths and limitations of the study sample is presented elsewhere.⁴¹ Further research to validate the use of the susceptibility measure with other adolescent samples is needed to ensure that results are generalizable beyond the present study.

Another limitation is that self-reported data from adolescents are subject to recall and social desirability bias. To reduce the potential for bias, sensitive information about adolescents' health and sexuality was collected using audio-CASI. There are also potential limitations in classifying adolescents into different levels of susceptibility. This classification scheme was utilized because previous research has suggested that sexually abstinent young people are categorically different in their susceptibility to initiating sexual intercourse. Significant differences in the hypothesized directions in all measures of construct and predictive validity in our data provide additional empirical support for this scheme. However, adolescents who may be targeted on the basis of their classification as highly susceptible might be stigmatized in an intervention program. Furthermore, our susceptibility index included several sensitive questions that may be inappropriate for administration in some settings. Therefore, this measure is best used for specific research and intervention purposes.

A better understanding of susceptible adolescents would facilitate effective intervention at a critical juncture in their development of risk behavior.

Conclusions

Given the construct and predictive validity of the susceptibility measure demonstrated in this study, sexual health researchers and program planners should consider including such a measure in their survey instruments and research designs. The cognitive susceptibility index is easily administered and could serve as an intermediate outcome for assessing the effectiveness of interventions to delay the onset of sexual intercourse. These interventions may be more effective if messages about postponing intercourse are targeted at and tailored to susceptible early adolescents. Youth who have not yet initiated intercourse have diverse sexual expectations, biological and psychological characteristics, and social attributes that must be considered in designing adolescent programming and research.

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In Memoriam

The editors of *Perspectives on Sexual and Reproductive Health* were saddened to learn that Felicia Stewart died on April 13, at age 63, after a long struggle with lung cancer. Over the course of her distinguished career, Felicia held academic, clinical and government positions, through which she sought to ensure the reproductive health and rights of all women and men. She had a long-time association with *Perspectives*, as an author (most recently in our March issue), a reviewer and a member of our editorial advisory committee.