Tracing the Roots of Early Sexual Debut Among Adolescents in Psychiatric Care

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Abstract

Objective: To identify the most important social and personal characteristics related to early sexual debut among troubled teenagers.

Method: One hundred ninety-eight youths aged 12–19 years were recruited from outpatient mental health clinics and completed self-reports and interviews about their age of sexual debut; family, peer, and partner relationships (e.g., parental hostile control, negative peer influence, need for intimacy); and personal characteristics (e.g., achievement motivation, externalizing problems). Broad-band (externalizing, internalizing) and narrow-band (depression/anxiety, delinquency) psychopathology was assessed with the Youth Self-Report and Child Behavior Checklist.

Results: Optimal Data Analysis was used to generate a classification tree model to identify variables associated with whether or not youths initiated oral, vaginal, and/or anal sexual activity before or after age 14. Three social context variables (parental hostile control, negative and positive peer influence) and one personal characteristic (externalizing problems) correctly classified 87.4% of teenagers as initiating sexual activity at ≤14 or >14 years of age.

Conclusions: Parental behavior and peer influence were the most important variables associated with the timing of sexual debut. Results support a social-personal framework for understanding sexual risk-taking among adolescents in psychiatric care, and the data offer relatively strong evidence that specific factors could be used to identify troubled teens at risk for early sexual debut.

Keywords

adolescents; sexual debut; social-personal context; psychiatric care

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It has been 20 years since the first case of acquired immunodeficiency syndrome (AIDS) was diagnosed, and despite efforts to curb the spread of human immunodeficiency virus (HIV), rates of infection are rising among adolescents. Young people account for 25% of new sexually transmitted diseases (STDs) reported annually, and the number of HIV-infected youths doubles every 14 months (Centers for Disease Control and Prevention [CDC], 1998, 2000a). Sexual activity is the primary mechanism of HIV transmission among teens (DiClemente, 1996; Pequagnat and Szapocznik, 2000), with 57% of males and 49% of females infected through sexual contact, but only 8% of males and 11% of females infected through intravenous drug use (CDC, 2000a). Teenagers are initiating sex at earlier ages (CDC, 2000a), and early sexual

debut is associated with higher HIV exposure because it is linked to more frequent sexual intercourse, more lifetime STDs, less consistent contraceptive use, and more sexual partners (Brooks-Gunn and Paikoff, 1993; CDC, 1992; Durbin et al., 1993; Miller et al., 1999). Some youths are at greater risk than others. Teens in psychiatric care, for example, engage in higher rates of sexual risk-taking than their same-age peers (Brown et al., 1997; Donenberg et al., 2001); they initiate sex at earlier ages and report high rates of sex without a condom, sex while using drugs and alcohol, and sex with multiple partners (Donenberg et al., 2001, 2002). Important linkages exist between mental health problems and HIV risk (Donenberg et al., 2001; Rotheram-Borus et al., 1989; Stiffman et al., 1992), but little is known about the factors related to sexual debut for teens in psychiatric care. Discerning the mechanisms related to earlier versus later sexual debut has important implications for HIV prevention efforts. The current study sought to identify key social and personal factors associated with sexual debut among troubled teens.

Most theories of health behavior implicate cognitive factors in sexual risk-taking, including HIV knowledge, motivation, and behavioral skills (Ajzen and Fishbein, 1980; Bandura, 1994; Fisher et al., 1992). There is evidence that these models may be less applicable to youths with mental health problems, in large part because these teens have cognitive processing problems (e.g., impaired judgment, poor reality-testing, inadequate problem-solving skills) and interpersonal deficits (e.g., lack of assertiveness, poor peer relations) that interfere with HIV prevention behavior (Moss and Donenberg, 2003). For youths in psychiatric care, social and personal factors may be more salient predictors of risk and prevention.

The Social Context of Sexual Behavior

Ecodevelopmental Theory (Szapocznik and Coatsworth, 1999) offers a framework of sexual activity and psychological adjustment in relation to social and personal factors. Risk is viewed within a social context that includes multiple interacting systems, most notably families, peers, communities, and schools (Perrino et al., 2000). Evidence supports the family as the most fundamental influence on adolescent behavior (Combrinck-Graham, 1989; Small and Luster, 1994). Complex relations among multiple social contexts heighten or diminish the likelihood of adolescent sexual risk-taking and psychopathology (Perrino et al., 2000), but risk is lowest when connections between systems (e.g., parents and children) are healthy, close, and positive (Szapocznik and Coatsworth, 1999). Consistent with Ecodevelopmental Theory, research links sexual behavior with two important social factors, parenting styles and peer behavior and attitudes (Brooks-Gunn and Paikoff, 1993; Hofferth and Hayes, 1987).

Parenting Styles.

Two dimensions of parenting are associated with youths' sexual behavior and attitudes: *affective factors* (i.e., warmth, support, hostility) and *instrumental characteristics* (i.e., monitoring, supervision, control) (Baumrind, 1987). Affective factors related to delayed sexual debut include parental support, family cohesion and connectedness, close family relationships, and parent–teen relationship satisfaction (Benda and DiBlasio, 1994; Biglan et al., 1990b; Chewning and Koningsveld, 1998; Danziger, 1995; DiBlasio and Benda, 1990; Fisher and Feldman, 1998; Jaccard et al., 1998; Resnick et al., 1997; Upchurch et al., 1999). Greater adolescent-reported satisfaction with the maternal relationship, namely affection, emotional support, and discipline, is associated with later sexual debut (Jaccard et al., 1996), whereas maternal reports of parental rejection are related to early-onset sexual intercourse in teens (Whitbeck et al., 1999). Many studies link affective family factors to the timing of adolescent sexual debut, but little is known about the nature of these patterns for troubled youths, whose family relationships are often strained and conflictual.

Instrumental parenting characteristics such as permissiveness and monitoring are also related to teens' sexual experience. Later sexual debut is associated with more parental monitoring, less parental permissiveness, and the presence of household routines and rules (Danziger, 1995; Li et al., 2000; Metzler et al., 1994; Miller et al., 1998, 1999; Romer et al., 1994, 1999). Parental monitoring reduces opportunities for early sexual activity by limiting adolescents' exposure to sexual possibility situations (Paikoff, 1995). Increased parental monitoring is also linked to reductions in other health-compromising behaviors that often co-occur with risky sex, such as drug and alcohol use (Li et al., 2000; Thomas et al., 2000) and delinquency (Ary et al., 1999; Gorman-Smith et al., 1996). Overly strict parenting and intrusive psychological control, however, have been implicated in earlier sexual debut (Ku et al., 1993; Upchurch et al., 1999).

Among teens in psychiatric care, elevated rates of risky sexual behavior are linked to low parental monitoring, and for girls only, to high parental permissiveness (Donenberg et al., 2002). Donenberg et al. (2002) found an association between parenting practices and sexual risk-taking among troubled youths, but they did not evaluate the impact of parental monitoring or permissiveness on teens' sexual debut specifically, nor did they include affective factors that might be related to sexual behavior. Thus it is unclear how affective and instrumental parenting factors are related to initial sexual activity among these youths. To shed light on this issue, we assessed whether affective (e.g., hostile control, positive involvement) and instrumental (e.g., monitoring, permissiveness) parenting characteristics could be used to classify youths who initiated sexual activity at or before age 14 versus after age 14.

Peer and Partner Influences.

Ecodevelopmental Theory also implicates peer and partner relationship attitudes in the timing of sexual debut (Biglan et al., 1990a; Graber et al., 1998; Perrino et al., 2000). Peers and romantic partners become increasingly important during adolescence, and perceptions of peer norms influence teens' sexual behavior (Doljanac and Zimmerman, 1998; Rogers, 1993; Whitaker and Miller, 2000). However, the link between peer/partner relationships and sexual behavior for troubled youths may be unique. Peers and partners may exert a particularly strong influence on teens in psychiatric care because their family relationships are often strained. Troubled youths may initiate sexual behavior early in order to achieve intimacy, reassurance, and support they lack at home. Practicing prevention may be a low priority if it risks partner rejection or disapproval by peers.

Whereas negative peer and partner influences can lead to health-compromising behaviors (DiClemente et al., 1996; St. Lawrence, 1993), positive peer influences may protect youths against early sexual debut. Evidence suggests that prosocial peer influence (e.g., associating with peers who get good grades and avoid risk-taking) is related to delayed sexual behavior (Meschke et al., 2000; Whitbeck et al., 1999), and positive peer influence has been an effective health-risk reduction method for youths (Rollin et al., 1995; Swadi and Zeitlin, 1988). This study tested the relation among sexual debut, positive and negative peer influences, need for intimacy, and fear of rejection for troubled teens.

The Personal Context of Sexual Behavior

Achievement Motivation and Self-Efficacy.

We also tested the influence of three personal characteristics that have been linked to teens' first sexual experience and may protect them from early sexual debut: achievement motivation, perceptions of self-efficacy, and mental health status (Brooks-Gunn and Paikoff, 1993; Graber et al., 1998; Hofferth and Hayes, 1987; Perrino et al., 2000). High achievement motivation is related to delayed sexual activity and less teen pregnancy, whereas low achievement is linked

to early sexual debut and pregnancy (Brooks-Gunn et al., 1993; Brooks-Gunn and Paikoff, 1993). High-achieving youths with future goals may avoid risk-taking, and by associating with high-achieving peers, these teens are part of a social network that supports positive and healthy behavior. Likewise, low self-efficacy is related to increased sexual risk-taking (DiClemente et al., 1996; Fisher et al., 1999; Kasen et al., 1992), and high self-efficacy is related to more condom use, assertiveness in sexual situations, less risky sexual behavior, and delayed sexual activity (Catania et al., 1989; MacDonald et al., 1990; Sieving et al., 1997).

Mental Health.

A third personal characteristic we examined was mental health status. Internalizing problems (depression, anxiety) are related to low perceived self-efficacy (Brooks-Gunn and Paikoff, 1997; Brown et al., 1997), decreased assertiveness, minimal ability to negotiate safe sex with a partner (McFarlane et al., 1995), sexually permissive attitudes, having sexually active friends, high risk of pregnancy, low contraception use, and nonvirgin status (Dolcini and Adler, 1994; Hayes, 1987; Henggeler et al., 1992; Rotheram-Borus et al., 1989, 1995; Whitbeck et al., 1993). Externalizing problems (aggression, delinquency) are also associated with high rates of risky sex, frequent sexual activity, early sexual debut, low rates of condom use, high numbers of sexual partners, and high rates of prostitution and drug/alcohol use before and during sex (Koopman et al., 1994; Rotheram-Borus and Koopman, 1991; Rotheram-Borus et al., 1989; Stiffman and Cunningham, 1991). Among troubled teens, externalizing problems appear more strongly related to sexual risk-taking than internalizing problems (Donenberg et al., 2001), but we are not aware of any studies that have assessed the links between mental health problems and sexual debut or different mental health problems and the timing of sexual debut. Moreover, we did not find any studies of achievement motivation and self-efficacy in relation to initial sexual experience among youths in psychiatric care. Thus we tested the influence of achievement motivation, self-efficacy, and broad-band and narrow-band mental health problems on teens' first sexual experience.

Defining Sexual Debut

Most research on adolescent sexual activity focuses on vaginal and/or anal intercourse, because these behaviors pose the greatest threat of HIV exposure. Yet HIV transmission also occurs through oral sex, an activity that is prevalent among youths, beginning as early as seventh grade (Kaiser Family Foundation, 2000; Remez, 2000; Urban Institute, 2000). A substantial number of teens have oral sex prior to vaginal sex (Schuster et al., 1996; Schwartz, 1999; Werner-Wilson, 1998), and recent surveys suggest that 39% to 55% of youths have given or received oral sex (Gates and Sorenstein, 2000; Kaiser Family Foundation and Seventeen, 2001; Urban Institute, 2000). Even more disturbing, many youths do not consider oral sex to be sex and believe it is a safe or no-risk activity (Kaiser Family Foundation and Seventeen, 2001; Mulrine, 2002), despite reports of the serious health risks (CDC, 2000b). Any unprotected sexual activity poses a threat of HIV infection. We sought to capture all youths at risk of exposure and therefore defined sexual debut as the first oral, vaginal, or anal sexual experience.

Summary

We sought to develop a unique portrait of the central family, peer, partner, and personal characteristics associated with the timing of sexual debut for youths in psychiatric care. We built on earlier research in several important ways: (1) We focused on sexual debut among youths in treatment. (2) We examined the effects of different mental health problems on the timing of sexual debut. (3) We based our study on Ecodevelopmental Theory, a conceptual framework that positions adolescent sexual behavior within a relational context (e.g., families, peers, partners). (4) We focused on an outcome variable that poses significant risk for HIV exposure. (5) Wherever possible, we included parent and youth reports of the predictor

variables to avoid reporter bias. Discerning the principal determinants of early debut will provide important directions for future prevention programs.

METHOD

Overview of Procedures

This study is part of a larger longitudinal project exploring HIV-risk determinants among youths in psychiatric care. Participants were adolescents and caregivers (hereafter referred to as "parents") receiving outpatient mental health services at three hospitals in urban Chicago. At two sites, participants were recruited by clinic staff who telephoned eligible families and informed them of the study. At the third clinic, parents and youths completed several questionnaires as part of the standard clinical protocol, and the interviewer requested the family's permission to use the clinical data for research. At all three clinics, parents and youths were reassured that participation was completely voluntary and their decision to participate would have no impact on their medical or psychiatric care. Following consent/assent procedures, parents and teens separately completed study measures. The present study analyzed parent and teen reports of parental behavior and adolescent psychopathology and youth reports of their own personal characteristics, peer and partner relationships, self-efficacy beliefs, and sexual behavior. Upon completion of the interview, parents and teens were paid for their participation and given an informational pamphlet about AIDS transmission and prevention. Total testing time was approximately 3 hours.

Participants

We invited 380 families to participate in the study, and 227 agreed (60%). Independent samples t test indicated consenters and refusers did not differ significantly by child gender ($p = .676$) or by child age ($p = .082$). Multivariate analyses were performed for those participants who had a complete set of data ($N = 198$). Subjects were 12 to 20 years old (mean = 15.15; SD = 1.84), and 42.9% ($n = 85$) were female. Teens were ethnically diverse (44% African/African-American, 35% white, 10% Latino, 6% biracial, 3% other, 2% Asian), and 46% scored in the first three levels of the Hollingshead (1975) index, indicating that roughly half of the participants were from low- to middle-income families. Youths were excluded from the study if they (1) were identified by clinic staff as cognitively impaired and limited in their ability to understand the questions or the assent process ($n = 40$); (2) did not speak English (measures are normed for English speakers) ($n = 20$); and (3) did not live with a guardian or caretaker ($n = 5$). (4) Wards of the Department of Child and Family Services (DCFS) were excluded because the internal institutional review board of the DCFS denied project approval.

Youths qualified for a range of psychiatric disorders according to the Computerized Diagnostic Interview Schedule for Children (C-DISC) (Costello et al., 1984; Shaffer et al., 1991, 2000). Based on a subset of parent reports (77.3%), 22% of teenagers qualified for a mood disorder, 31% met criteria for an anxiety disorder, 41% qualified for a disruptive behavior disorder, and 65% met criteria for at least one psychiatric disorder. Parental symptom ratings on the Child Behavior Checklist (CBCL) (Achenbach, 1991a) were relatively consistent with diagnostic rates generated from the C-DISC; 50% and 49% of parents reported adolescent internalizing and externalizing symptoms in the clinical range. Rates of DISC-generated diagnoses in this sample are similar to those of other studies of general clinic populations (Jensen and Weisz, 2002).

Consistent with prior research (Brown et al., 1997; DiClemente and Ponton, 1993; Donenberg et al., 2001, 2002), teens in this study reported high rates of risky sexual behavior; 39% reported ever having vaginal, anal, and/or oral sex, and among sexually active youths ($n = 77$), 42% had sex with a high-risk partner, 49% had sex while using drugs/alcohol, 66% had sex without

a condom, and 5% had been pregnant. With regard to vaginal and anal sex only ($n = 68$), 34% ever had intercourse, 40% had sex with a high-risk partner, and 44% had sex without a condom.

Measures

Demographics.—Parents provided information about their adolescent's age, gender, and ethnicity and the family's socioeconomic status.

Parenting Styles.—We used three measures to assess affective and instrumental parenting styles. The Parenting Style Questionnaire (PSQ) (Oregon Social Learning Center, 1990) measures the degree of parent- and youth-reported parental permissiveness and monitoring. Adolescent-perceived parental monitoring ($\alpha = .71$) and permissiveness ($\alpha = .72$) and parent-reported parental monitoring ($\alpha = .73$) were used in the data analyses. Coefficient α (Cronbach, 1951) is an index of internal consistency reliability that gauges the degree to which a set of items reflects the same underlying construct based on analysis of item intercorrelations. Composite scales with α values below .50 contain more measurement error than true-score variance and are unlikely to be useful in testing bivariate relationships (Kline, 1998). Higher PSQ scores represent higher levels of monitoring and permissiveness. The PSQ's reliability and validity are well established, and it has been used extensively with deviant pre-teens and teens (Oregon Social Learning Center, 1990). The 78-item version of the Children's Report of Parenting Behavior Inventory (CRPBI) (Schaefer, 1965) was used to evaluate adolescent perceptions of four parenting behaviors: Hostile Control ($\alpha = .79$), Rejection ($\alpha = .82$), Positive Involvement ($\alpha = .84$), and Intrusiveness ($\alpha = .60$). With the exception of Rejection, higher scores indicate higher levels of the behavior. Sample items from the Hostile Control scale include "Wants to control whatever I do" and "Is always telling me how I should behave." The CRPBI has been used across samples and cultures (Schludermann and Schludermann, 1970), and its reliability and validity are well documented (Schaefer, 1965). The Self-Report Measure of Family Functioning (Bloom, 1985) is a compendium of scales derived from other measures of family behavior. We used the five-item Family Disengagement Scale to measure the degree to which family members are involved in each others' lives ($\alpha = .50$). Higher scores on this scale indicate greater family disengagement, although reliability for this subscale was relatively low.

Peer and Partner Influences.—Teenage Relationships measures fear of rejection and need for intimacy in close relationships. Five items measure youths' feelings of security and sensitivity to rejection, and eight items assess the desire for intimacy. The Fear of Rejection scale was developed for late adolescents in dating relationships (Downey and Feldman, 1996), and the intimacy items are from Social Dating Goals scale. Item wording was modified for urban youths, and internal consistency was acceptable for both scales (fear of rejection $\alpha = .75$; need for intimacy $\alpha = .82$). We used two scales from the Health Questionnaire (HQ) (Jessor and Jessor, 1977) to measure negative and positive peer influence: Peer Support for Risky Behavior (PSRB) and Friends as Models for Conventional Behavior (FMCB). The PSRB ($\alpha = .90$) measures peer approval of drinking alcohol, smoking marijuana, smoking cigarettes, and having sex. FMCB measures friends' involvement in after-school activities and organized sports and had a relatively low internal consistency ($\alpha = .57$). Positive and negative peer influence correlated -0.31, $p < .0001$. The HQ has been widely used with preadolescents and adolescents, and evidence of reliability and validity is extensive (Costa et al., 1995, 1996; Donovan et al., 1991).

Personal Characteristics.—Achievement Motivation ($\alpha = .78$) measures youths' value on achievement and is a subscale of the HQ (see above). The seven-item Self-Efficacy scale (Fisher and Misovich, personal communication, 1998) assesses perceptions of self-efficacy to prevent HIV transmission (assertive, refusal, and performance self-efficacy) and to negotiate

HIV prevention with a partner ($\alpha = .67$). Mental health symptoms were measured with the CBCL and Youth Self-Report (YSR). The CBCL is a widely used, standardized parent-report measure of 118 child behavior problems normed for youths aged 4–18 years. The YSR is the adolescent version of the CBCL; it contains 112 self-statements and is normed for 11–18-year-olds. Both generate raw and T scores for broad-band internalizing (e.g., sadness, anxiety) and externalizing (e.g., fighting, swearing) problems and eight narrow-band syndromes (e.g., depressed/anxious, delinquency, social problems). There is extensive evidence of their test-retest reliability, criterion validity, and convergent validity (Achenbach, 1991a,b). Internal reliability in the current study ranged from 0.58 to 0.93 on the YSR and from 0.65 to 0.95 on the CBCL.

Sexual Debut.—The AIDS Risk Behavior Assessment (ARBA) (Donenberg et al., 2001) is a self-administered interview designed specifically for use with adolescents to assess their self-reported sexual behavior, drug/alcohol use, and needle use. It was derived from five well-established measures of sexual behavior and drug/alcohol use (Dowling et al., 1994; Institute of Behavioral Sciences, 1991; National Institute on Drug Abuse, 1995; Needle et al., 1995; Watters, 1994; Weatherby et al., 1994). This study focused on the timing of adolescent-reported first oral, vaginal, and/or anal sexual experience with ≤14 years of age defined as early debut and >14 years of age defined as later debut. We chose age 14 as the cutoff because it is below the national median age of first sexual intercourse at 16.5 years (Warren et al., 1998), and it is at the median age of first sexual activity (oral, vaginal, and anal) in our high-risk sample. Moreover, research indicates that first sex prior to age 14 is associated with a high number of lifetime sexual partners, a key factor in the spread of STDs and HIV/AIDS. The ARBA uses a skip structure so that initial screening questions answered in the negative are not followed by more detailed items. Youths self-administered the ARBA using a voice-directed computer ($n = 91$) or a portable cassette tape player, and they recorded their responses on a questionnaire ($n = 107$). Rates of early sexual debut were not significantly different for the two methods of interview administration controlling for age ($p = .70$). In both cases, an interviewer remained in the room to answer questions and to ensure item comprehension.

Analytic Strategy

The primary purpose of the data analysis was to generate a classification model that identified as accurately as possible whether youths initiated oral, vaginal, or anal sexual activity at ≤14 years of age (i.e., early sexual debut) or >14 years of age (i.e., later sexual debut). We used Optimal Data Analysis (ODA) to conduct a nonlinear, hierarchically optimal classification tree analysis (CTA) (Yarnold, 1996; Yarnold et al., 1997) and to construct a multiattribute "tree" model in which successive predictors served to classify with maximum accuracy a gradually decreasing proportion of the total sample. ODA finds classification rules that maximize the overall percentage of classification accuracy at each step of the analysis (Ostrander et al., 1998; Yarnold, 1996) by finding an optimal cut point for each predictor variable (e.g., if parental monitoring score ≤9.5, then predict early sexual debut; if parental monitoring score >9.5, then predict later sexual debut). The cut point maximizes overall percentage of classification accuracy by predicting whether scores above or below the cut point are in one category or the other. We used ODA 1.0 computer software (Soltysik and Yarnold, 1993) to estimate all optimal classification models.

We used two statistical procedures to remove or "prune" the nodes of the classification tree to reduce the likelihood of capitalizing on chance. First, we conducted "jack-knife" leave-one-out (LOO) analyses of each node in the tree to assess its likelihood of replicating in an independent sample (Soltysik and Yarnold, 1993). In LOO analyses, each subject is removed from the sample one at a time, an ODA model is obtained for the remaining subsample, the ODA decision rule is used to classify the single removed subject, and the classification results

are stored and tabulated iteratively across all participants. We included only those nodes that were LOO stable in the final classification tree in order to increase the cross-sample generalizability of the final CTA model. We also used a sequentially rejective Bonferroni-type multiple comparisons procedure to control for experiment-wise type I error (Cook and Campbell, 1979; Ryan, 1959) and to increase confidence in the effects (Klockars et al., 1995). We used a Sidak step-down adjustment procedure (Holland and Copenhaver, 1987; Soltysik and Yarnold, 1993) to prune nodes from the tree if their type I error exceeded 0.05, controlling for the number of nodes in the final tree model.

We evaluated the overall predictive performance of the final CTA model in terms of (1) its overall classification accuracy (the percentage of the total sample correctly classified by the tree model); (2) its sensitivity (the percentage of the actual members of a given category correctly classified); (3) its specificity (a prognostic index indicating the percentage of the predicted classifications into a given category that were correct); and (4) its effect strength (an absolute index of effect size for which 0 = performance expected by chance and 100 = perfect classification accuracy). Effect strength values ≤0.25 are considered weak, values between 0.25 and 0.5 are considered moderate, and values >0.5 are considered strong (Yarnold and Soltysik, in press). We also evaluated the final tree model's overall effect strength, expressed in terms of the mean of effect strength for sensitivity and for specificity, as a global summary of the model's classification performance from both descriptive and prognostic perspectives.

RESULTS

Univariate Analyses

We analyzed 41 predictors representing five social and personal constructs in building the classification tree: (1) four demographic characteristics (sex, age, ethnicity, socioeconomic status), (2) seven affective and instrumental parenting styles (permissiveness, monitoring, positive involvement, intrusiveness, rejection, hostile control, disengagement), (3) four peer and partner influences (desire for intimacy, fear of rejection, negative peer influence, positive peer influence), and (4) three personal characteristics (achievement motivation, self-efficacy, parent-and youth-reported adolescent psychopathology). Table 1 summarizes the results for the univariate associations between early sexual debut and the predictors identified by ODA. The univariate relations support previous theory and research: early sexual debut was associated with parenting variables (permissiveness, monitoring, hostile control), peer and partner relationship factors (need for intimacy, negative peer influence), and personal characteristics (achievement motivation, adolescent psychopathology). However, the univariate relationships do not indicate how these variables work together to predict sexual debut. Thus we turn to the CTA to clarify these relationships.

Classification Tree Analysis

Figure 1 presents the final ODA classification tree model. Circles represent decision points, arrows represent predictive pathways, and rectangles represent final classifications. Numbers beneath the decision points are the generalized *p* value for that point. Numbers beside the arrows indicate the cutoff value for optimally classifying observations into categories. Fractions beneath the points represent the number of correct classifications at that endpoint (numerator) and the total number of subjects classified at the endpoint (denominator). Numbers in parentheses beside the fractions are the percentage of the predicted classifications into the given category that were correct.

The single strongest predictor of later sexual debut (i.e., the first variable to enter the tree model) was parental hostile control. Among adolescents reporting *lower* levels of parental hostile control, there were three predictive profiles associated with later sexual debut and two

predictive profiles associated with early sexual debut. For the left primary branch of the tree model—i.e., adolescents below the cutoff score on parental hostile control (scores ≤24.4)—the second variable to enter the model was negative peer influence. If negative peer influence was relatively low (≤14.5), then the model predicted later sexual debut with 92.6% accuracy. Thus low levels of parental hostile control and negative peer influence strongly predicted *later* sexual debut. For youths above the cutoff score on negative peer influence (scores >14.5), this variable was also the third predictor to enter the tree model. In this way, the model parsed scores on the measure of negative peer influence into three ordinal segments (low scores ≤14.5; moderate scores >14.5, but ≤17.5; high scores >17.5), each of which had a different predictive profile. Among teens who reported low levels of parental hostile control and moderate to high negative peer influence, there were two distinct profiles predictive of later sexual debut and two distinct profiles predictive of earlier sexual debut.

When parental hostile control was relatively low and negative peer influence was moderate, the timing of sexual debut depended on teens' self-reported level of externalizing symptoms. Fewer problems (*T* score ≤67.5) predicted later debut with 85.2% accuracy, whereas more symptoms (*T* scores >67.5) predicted early sexual debut with 50% accuracy. This latter classification endpoint represents the model's lowest performance in predicting the timing of sexual debut. When parental hostile control was relatively low and negative peer influence was high, the timing of sexual debut depended on the presence of positive peer influence. Less positive peer influence (scores ≤8.5) predicted early debut, while more positive peer influence (scores >8.5) predicted later debut with 100% accuracy. Thus positive peer influence matters most when parental hostile control is low and negative peer influence is high. Overall predictive accuracy for this left primary branch of the classification tree was 89.1% (131/147).

For the right primary branch of the model—i.e., youths with high parental hostile control (scores >24.4)—the second predictor in the model was also negative peer influence. However, the cutoff score for this variable was lower than for the same variable in the tree's left primary branch (9.5 versus 14.5). This pattern of results suggests that under conditions of high parental hostile control, less negative peer influence is linked to early sexual debut. Among adolescents reporting *higher* levels of parental hostile control, there were two predictive profiles associated with later sexual debut and one predictive profile associated with early debut. If negative peer influence was less than or equal to 9.5, then the model predicted later sexual debut with 100% accuracy. When parental hostile control was high, less negative peer influence predicted later sexual debut. If negative peer influence was greater than 9.5, then youths were classified as later or earlier debut on the basis of parent-reported externalizing symptoms: (1) low externalizing symptoms (scores ≤64) predicted later debut with 80% accuracy, and (2) high externalizing symptoms (scores >64) predicted early debut with 72.7% accuracy. Overall predictive accuracy for this right primary branch of the classification tree was 82.4% (42/51).

Table 2 presents statistics summarizing the classification performance of the ODA tree model. The model correctly classified 173 (87.4%) of the total 198 adolescents. This represents an absolute effect strength of 62.4% and is a strong effect size for classification sensitivity (Yarnold and Soltysik, in press). In addition, 91.0% of the youths predicted as late initiators actually reported later debut, and 74.4% of those predicted as early initiators actually reported early debut. This reflects an absolute effect strength of 65.4% and is a strong effect size for classification specificity (Yarnold and Soltysik, in press). Combining measures of sensitivity and specificity into a single index of classification performance, the tree model had an overall effect strength of 63.9%—again, a strong effect size in absolute terms.

DISCUSSION

This study revealed a complex interplay of social and personal factors associated with sexual debut among youths in psychiatric care. Together, three social context variables (parental hostile control, negative and positive peer influence) and one personal characteristic (externalizing symptoms) correctly classified almost 90% of teens as initiating sexual activity at ≤14 or >14 years of age. The analysis yielded a strong classification effect size, underscoring the importance of these variables in the timing of sexual debut among troubled youths and the critical role of families, peers, and psychopathology in HIV prevention programming for these teens.

Results indicated that parent behavior is a central factor in adolescents' initial sexual activity; parental hostile control was the single most powerful variable linked to sexual debut. These data are consistent with research linking affective and instrumental family characteristics to adolescent sexual behavior, but they extend the literature to sexual debut and to youths in psychiatric care. Parental hostile control represents a combination of affective (hostile) and instrumental (control) characteristics and is similar to construct of "affectionless control," operationalized as low parental care and high overprotection (Parker, 1979). Research associates affectionless control with childhood depression (Parker, 1983), aggression (Rey and Plapp, 1990), and general psychopathology (Burbach et al., 1989), but we are unaware of any studies linking affectionless control to sexual behavior. This study extends the potential negative health outcomes of parental affectionless control to early sexual debut and underscores the need for parental involvement in HIV prevention programs. HIV prevention programs that include families are showing considerable promise in reducing teens' risky sexual behavior (Pequagnat and Szapocznik, 2000).

The tree model revealed five unique profiles associated with *later* sexual debut; three of these involved low parental hostile control combined with either (1) low peer influence, (2) moderate peer influence and low adolescent-reported externalizing symptoms, or (3) high negative peer influence and high positive peer influence. Evidently, at lower levels of parental hostile control, the absence of externalizing problems protects teens from the effect of moderate levels of negative peer influence, and the presence of positive peer influence protects youths from the effect of high levels of negative peer influence. The other two profiles related to *later* sexual debut involved high parental hostile control combined with either (1) low negative peer influence or (2) high negative peer influence and few parent-reported externalizing symptoms. Together, these five profiles correctly classified 141 (92.8%) of the 152 youths who reported later sexual debut. From these results, it appears that in combination with parental behavior, positive and negative peer influence significantly affect the timing of sexual debut among troubled youths. Adolescent externalizing problems, however, affect debut in the context of peers and parents.

Taken together, the data may be most appropriately viewed as supporting a risk rather than a protective model because it is the absence of risk factors that are linked to later sexual debut, namely less externalizing problems, negative peer influence, and parental hostile control. However, this study may underestimate the role of protective factors since our assessment methods focus on risk rather than resilience or adaptive coping. Nevertheless, our data suggest that positive peer influence can serve as a protective factor in the context of lower parental hostile control and high negative peer influence.

Findings also revealed three clusters of youths who reported *early* sexual debut; two of these involved low parental hostile control combined with either (1) moderate negative peer influence and high adolescent-reported externalizing symptoms or (2) high negative peer influence and low positive peer influence. The other profile linked to *early* sexual debut

involved high parental hostile control combined with high negative peer influence and parent-reported externalizing problems. Together, these three profiles correctly classified 32 (69.6%) of the 46 adolescents who debuted early. Whereas positive peer influence appears to counteract negative peer influence for youths who report less parental hostile control, even low levels of negative peer influence may steer youths who report high parental hostile control toward early debut.

There are at least two possible explanations for this pattern of results. Teens may be especially vulnerable to peer influence in the context of high parental hostile control, whereby even a small amount of negative peer influence (i.e., support for high-risk behavior) may make these youths susceptible to early sexual activity in order to maintain intimacy and avoid partner rejection. Alternatively, the link between early debut and negative peer influence coupled with externalizing problems may support a problem behavior syndrome with early sexual debut being a part of the larger syndrome (Jessor, 1991; Jessor and Jessor, 1977). Prior research has shown that negative peer influence affects adolescent sexual risk-taking (Donenberg et al., 2001), but this study extends the literature to early sexual debut and provides new information about the protective influence of peers who engage in positive behavior (i.e., after-school activities, clubs, sports, good grades).

Both parent- and adolescent-reported psychopathology were related to early sexual debut, but in different ways. Parent reports were relevant in the context of high parental hostile control, whereas youth reports were relevant in the context of low parental hostile control. This pattern represents a potentially important process that can be viewed in at least two ways. First, youths with more externalizing problems may evoke greater parental hostile control because of their behavior. Alternatively, parents who are more hostile and controlling may be overly vigilant, have little tolerance for misbehavior, and perceive their children as more externalizing because their expectations are high. In any case, the data support growing evidence that the most comprehensive picture of the determinants of adolescent risk-taking will emerge from multiple informants (Donenberg et al., 2001).

Limitations

Study limitations warrant careful interpretation of the results. Only 60% of eligible families participated in the study. Although our participation rate is relatively low, it is consistent with the typical 40% dropout from child therapy following the intake appointment (Weisz and Weiss, 1989) and may represent the same families who drop out of therapy. Only 65% of the sample qualified for a DISC diagnosis, raising the possibility that findings may not generalize to other clinical populations. However, diagnoses generated by the DISC are far more conservative than clinician ratings, and the rate of diagnoses in our sample is consistent with recent research using structured diagnostic interviews (see Jensen and Weisz, 2002). The model explained later sexual debut better than early sexual debut. This may be explained in part by the larger number of subjects who delayed sexual activity, or it may be because the reasons youths initiate sexual activity at an early age are more varied and complex than the reasons they delay sexual behavior. Like most research on sexual behavior, this study relied on adolescent self-reports of sexual debut, which may not be entirely accurate (e.g., social desirability, memory limitations).

The data in this study are correlational, and cause-and-effect relationships remain to be established. A variable's position in the classification tree does not imply temporal precedence. Nor does the order of the variables in the model indicate a sequence of cause and effect. Rather, the tree model is a predictive tool for maximizing classification accuracy in identifying the correlates of earlier or later sexual debut. Longitudinal research is needed to clarify the causal processes. It is also important to note that there is variation in how long ago youths reportedly experienced sexual debut. On average, early debut respondents said they first had sex about

two years before completing our measures (mean = 2.11, SD = 1.37). Thus the externalizing symptoms associated with early sexual debut may not have existed at the time of first sex. Indeed, it is conceivable that these symptoms developed *after* sexual debut and are a consequence or correlate of early debut rather than a predisposing risk factor. Clearly, prospective longitudinal research is needed to clarify the ambiguity concerning temporal precedence. About 61% of the current sample reported never having had sex, and thus we hope to address this issue directly as we measure these same individuals repeatedly over time in ongoing longitudinal research.

We used an innovative data-analytic technique (ODA) to identify the best social and personal factors associated with early versus later sexual debut. ODA models have been used to improve prediction of a variety of complex real-world phenomena (see Yarnold and Soltysik, in press), and this study extends its application to teenage risk behavior. However, the model did not achieve perfect classification accuracy, and thus future research is needed to identify other factors that may improve prediction. Indeed, we focused on a discrete set of theoretically driven and empirically supported social and personal variables, but other factors may influence the timing of sexual debut (e.g., family religious practices, onset of puberty, trauma, sexual abuse, school involvement). Moreover, some of the scales showed relatively low internal consistency and this may explain why they were not retained in the final model. We included gender, age, socioeconomic status, and ethnicity in the analyses, but they did not offer additional explanatory value. While the absence of effects related to gender are somewhat surprising, it is possible that the timing of sexual debut among girls and boys in psychiatric care is more congruent than among youths in the general population. The added presence of psychopathology may make these youths especially vulnerable to early risk-taking regardless of gender. Nevertheless, the risk profiles identified in this study may be used to guide primary and secondary HIV prevention efforts.

Clinical Implications

Findings from this study have important implications for clinical practice. Early sexual debut can directly or indirectly compromise health through its association with behaviors that increase risk of STD or HIV exposure. The data offer relatively strong evidence that specific factors could be used to identify troubled teens at risk for early sexual debut. In fact, high parental hostile control combined with high negative peer influence was the single most inclusive profile related to early sexual debut. Our findings suggest that clinicians can identify with close to 90% accuracy those youths who initiated sexual activity at or before age 14, by assessing parental hostile control, negative and positive peer influence, and adolescent externalizing problems.

It is noteworthy that the cutoff scores representing "high" externalizing problems were in the clinically significant range for parent and adolescent reports (Achenbach, 1991a,b). This study of youths in psychiatric care illustrates the additional risk of early debut for youths with clinically significant problems. Even scores on the other parenting and peer measures were relatively high and reflect meaningful levels of the behavior. Thus, although the cutoff scores were derived empirically, they are clinically relevant and have important implications for practitioners. For example, early sexual debut could be a marker for current parental hostile control and negative peer interactions, and discovery of sexual activity at or before age 14 should prompt exploration for negative peer influence, externalizing behavior, and parental hostile control.

This study focused on a single health-compromising behavior, early sexual debut, because it places youths at increased risk of HIV infection. Results support a social-personal framework for understanding sexual risk-taking among adolescents in psychiatric care and argue against the downward extension of adult-oriented cognitive models to explain adolescent health

behavior. Instead, research and theory must move beyond primarily cognitive conceptualizations of risk-taking and begin to incorporate other important variables, especially for troubled teens (Moss and Donenberg, 2003). This study suggests that a more powerful theoretical model may need to include family functioning, negative and positive peer influences, and adolescent psychopathology as key variables. Such models can then guide the design and implementation of uniquely tailored family-focused HIV prevention programs that incorporate empirically supported treatments for adolescent externalizing problems.

References

Achenbach T (1991a), *Manual for the Child Behavior Checklist/4–18 and 1991 Profile.* Burlington: University of Vermont Department of Psychiatry

Achenbach T (1991b), *Manual for the Youth Self-Report and 1991 Profile.* Burlington: University of Vermont Department of Psychiatry

Ajzen I, Fishbein (1980), *Understanding Attitudes and Predicting Social Behavior.* Englewood Cliffs, NJ: Prentice-Hall

Ary DV, Duncan TE, Biglan A, Metzler CW, Noell JW, Smolkowski K. Developmental model of adolescent problem behavior. J Abnorm Child Psychol 1999;27:141–150. [PubMed: 10400060]

Bandura A (1994), Social cognitive theory and exercise of control over HIV infection. In: *Preventing AIDS: Theories and Methods of Behavioral Interventions. AIDS Prevention and Mental Health,* DiClemente RJ, Petersen JL, eds. New York: Plenum, pp 25–59

Baumrind D (1987), A developmental perspective on adolescent risk-taking in contemporary America. In: *Adolescent Social Behavior and Health: New Directions for Child Development,* Irwin CE, ed. San Francisco: Jossey-Bass, pp 93–125

Benda B, DiBlasio FA. An integration of theory: adolescent sexual contacts. J Youth Adolesc 1994;23:403–420.

Biglan A, Lewin L, Hops H (1990a), *A Contextual Approach to the Problem of Aversive Practices in Families,* Patterson G, ed. Hillsdale, NJ: Erlbaum

Biglan A, Metzler CW, Wirt R, et al. Social and behavioral factors associated with high-risk sexual behaviors among adolescents. J Behav Med 1990b;13:245–261. [PubMed: 2213868]

Bloom BL. A factor analysis of self-report measures of family functioning. Fam Process 1985;24:225–239. [PubMed: 4018243]

Brooks-Gunn J, Guo G, Furstenburg FF. Who drops out of and who continues beyond high school? A 20-year follow-up of black urban youth. J Res Adolesc 1993;3:271–294.

Brooks-Gunn J, Paikoff R (1997), Sexuality and developmental transitions during adolescence. In: *Health Risks and Developmental Transactions During Adolescence,* Schulenberg J, Maggs J, Hurrelmann K, eds. New York: Cambridge University Press, pp 190–219

Brooks-Gunn J, Paikoff RL (1993), "Sex is a gamble, kissing is a game": adolescent sexuality and health promotion. In: *Promoting the Health of Adolescents: New Directions for the Twenty-First Century,* Millstein SG, Petersen AC, Nightingale EO, eds. New-York: Oxford University Press, pp 180–208

Brown LK, Danovsky MB, Lourie KJ, DiClemente RJ, Ponton LE. Adolescents with psychiatric disorders and the risk of HIV. J Am Acad Child Adolesc Psychiatry 1997;36:1609–1617. [PubMed: 9394948]

Burbach D, Kashani J, Rosenberg R. Parental bonding and depressive disorders in adolescents. J Child Psychol Psychiatry 1989;30:417–429. [PubMed: 2745592]

Catania JA, Dolcini MM, Coates TJ, et al. Predictors of condom use and multiple partnered sex among sexually-active adolescent women: implications for AIDS-related health interventions. J Sex Res 1989;26:514–524.

Centers For Disease Control and Prevention (1992), Selected behaviors that increase risk for HIV infection among high school students—United States, 1990. *MMWR Morb Mortal Wkly Rep* 41:231, 237–240

Centers for Disease Control and Prevention (1998), *Trends in the HIV and AIDS Epidemic* Atlanta: Department of Health and Human Services (*http://www.cdc.gov/hiv/stats/trrends98.pdf*)

Centers for Disease Control and Prevention (2000a), Cumulative AIDS Cases; Exposure Categories; Ten States/Territories and Cities Reporting the Highest Number of AIDS Cases; International Statistics (retrieved June 7, 2002, from *http://www.cdc.gov/hiv/stats.htm*)

Centers for Disease Control and Prevention (2000b), HIV/AIDS update, preventing the sexual transmission of HIV, the virus that causes AIDS: what you should know about oral sex (retrieved June 7, 2002, from *http://www.cdc.gov/nchstp/od/oral_sex.htm*)

Chewning B, Koningsveld R. Predicting adolescents' initiation of intercourse and contraceptive use. J Appl Soc Psychol 1998;28:1245–1285.

Combrinck-Graham L (1989), *Children and Family Contexts.* New York: Guilford

Cook TD, Campbell DT (1979), *Quasi-Experimentation: Design and Analysis Issues in Field Settings* Chicago: Rand McNally

Costa FM, Jessor R, Donovan JE, Fortenberry JD. Early initiation of sexual intercourse: the influence of psychosocial unconventionality. J Res Adolesc 1995;5:93–121.

Costa FM, Jessor R, Fortenberry JD, Donovan JE. Psychosocial conventionality, health orientation, and contraceptive use in adolescence. J Adolesc Health 1996;18:404–416. [PubMed: 8803732]

Costello A, Edelbrock C, Dulcan M, Kalas R, Klaric S (1984), *Development and Testing of the NIMH Diagnostic Interview Schedule for Children in a Clinic Population: Final Report.* Rockville, MD: Center for Epidemiologic Studies, NIMH

Cronbach LJ. Coefficient alpha and the internal structure of tests. Psychometrika 1951;16:297–334.

Danziger S. Family life and teenage pregnancy in the inner-city: experiences of African American youth. Child Youth Serv Rev 1995;17:183–202.

DiBlasio FA, Benda BR. Adolescent sexual behavior: multivariate analysis of a social learning model. J Adolesc Res 1990;5:449–466.

DiClemente RJ (1996), Adolescents at risk for AIDS: AIDS epidemiology, and prevalence and incidence of HIV. In: *Understanding and Preventing HIV Risk Behavior,* Oskamp S, Thompson S, eds. Thousand Oaks, CA: Sage, pp 13–30

DiClemente RJ, Lodico M, Grinstead OA, et al. African-American adolescents residing in high-risk urban environments do use condoms: correlates and predictors of condom use among adolescents in public housing developments. Pediatrics 1996;98:269–278. [PubMed: 8692629]

DiClemente RJ, Ponton LE. HIV-related risk behaviors among psychiatrically hospitalized adolescents and school-based adolescents. Am J Psychiatry 1993;150:324–325. [PubMed: 8422086]

Dolcini MM, Adler NE. Perceived competencies, peer group affiliation, and risk behavior among early adolescents. Health Psychol 1994;13:496–506. [PubMed: 7889904]

Doljanac RF, Zimmerman MA. Psychological factors and high-risk sexual behavior: race differences among urban adolescents. J Behav Med 1998;21:451–467. [PubMed: 9836131]

Donenberg G, Wilson H, Emerson E, Bryant F. Holding the line with a watchful eye: the impact of perceived parental monitoring and parental permissiveness on risky sexual behavior among adolescents in psychiatric care. AIDS Educ Prev 2002;14:138–157. [PubMed: 12000232]

Donenberg GR, Emerson E, Bryant FB, Wilson H, Weber-Shifrin E. Understanding AIDS-risk behavior among adolescents in psychiatric care: links to psychopathology and peer relationships. J Am Acad Child Adolesc Psychiatry 2001;40:642–653. [PubMed: 11392341]

Donovan JE, Jessor R, Costa FM. Adolescent health behavior and conventionality-unconventionality: an extension of problem-behavior theory. Health Psychol 1991;10:52–61. [PubMed: 2026131]

Dowling S, Johnson ME, Fisher DG. Reliability of drug users' self-report of recent drug use. Assessment 1994;1:382–392.

Downey G, Feldman S. The implications of rejection sensitivity for intimate relationships. J Pers Soc Psychol 1996;70:1327–1343. [PubMed: 8667172]

Durbin M, DiClemente RJ, Siegel D, Krasnovsky F, Lazarus N, Camacho T. Factors associated with multiple sex partners among junior high school students. J Adolesc Health 1993;14:202–207. [PubMed: 8323931]

Fisher JD, Misovich SJ, Fisher WA (1992), The impact of perceived social norms on adolescents' AIDS-risk behavior and prevention. In: *Adolescents and AIDS: A Generation in Jeopardy,* DiClemente RJ, ed. Beverly Hills, CA: Sage, pp 117–136

Fisher L, Feldman SS. Familial antecedents of young adult health risk behavior: a longitudinal study. J Fam Psychol 1998;12:66–80.

Fisher WA, Williams SS, Fisher JD, Malloy TE. Understanding AIDS risk behavior among sexually active urban adolescents: an empirical test of the information-motivation-behavioral skills model. AIDS Behav 1999;3(1):13–23.

Gates GJ, Sorenstein FL (2000), Heterosexual genital activity among adolescent males: 1988 and 1995. *Fam Plann Perspect* 32:295–297, 304

Gorman-Smith D, Tolan PH, Zelli A, Huesmann LR. The relation of family functioning to violence among inner-city minority youth. J Fam Psychol 1996;10:115–129.

Graber JA, Brooks-Gunn J, Galen BR (1998), Betwixt and between: sexuality in the context of adolescent transitions. In: *New Perspectives on Adolescent Risk Behavior,* Jessor R, ed. New York: Cambridge University Press

Hayes CD, ed (1987), *Risking the Future: Adolescent Sexuality, Pregnancy, and Childbearing* Washington, DC: National Academy Press

Henggeler SW, Melton GB, Rodrigue JR (1992), *Pediatric and Adolescent AIDS: Research Findings from the Social Sciences.* Newbury Park, CA: Sage

Hofferth SL, Hayes CD (1987), *Risking the Future: Adolescent Sexuality, Pregnancy, and Childbearing.* Washington, DC: National Academy Press

Holland BS, Copenhaver MD. An improved sequentially rejective Bonferroni test procedure. Biometrics 1987;43:417–423.

Hollingshead AB (1975), *Four Factor Index of Social Status.* New Haven, CT: Yale University Department of Sociology

Institute of Behavioral Sciences (1991), *Denver Youth Survey Youth Interview Schedule* Boulder: University of Colorado

Jaccard J, Dittus PJ, Gordon VV. Maternal correlates of adolescent sexual and contraceptive behavior. Fam Plann Perspect 1996;28:159–185. [PubMed: 8853281]

Jaccard J, Dittus PJ, Gordon VV. Parent–adolescent congruency in reports of adolescents' sexual behavior and in communication about sexual behavior. Child Dev 1998;69:247–261. [PubMed: 9499570]

Jensen AL, Weisz JR. Assessing match and mismatch between practitioner-generated and standardized interviewer-generated diagnoses for clinic-referred children and adolescents. J Consult Clin Psychol 2002;70:158–168. [PubMed: 11860042]

Jessor R. Risk behavior in adolescence: a psychosocial framework for understanding and action. J Adolesc Health 1991;12:597–605. [PubMed: 1799569]

Jessor R, Jessor SL (1977), *Problem Behavior and Psychosocial Development: A Longitudinal Study of Youth.* New-York: Academic Press

Kaiser Family Foundation (2000), Oral sex increasing "trend" among teens (retrieved June 13, 2002 from *http://www.kaisernetwork.org/Daily_reports/print_report.cfm*)

Kaiser Family Foundation and Seventeen (2001), SexSmarts Survey: A series of national surveys of teens about sex (retrieved June 13, 2002 from *http://www.kff.org/content/2001/3148/SummaryofFindings.pdf*)

Kasen S, Vaughan RD, Walter HJ. Self-efficacy for AIDS preventive behaviors among tenth grade students. Health Educ Q 1992;19:187–202. [PubMed: 1618627]

Kline RB (1998), *Principles and Practice of Structural Equation Modelling.* New York: Guilford

Klockars AJ, Hancock GR, McSweeny MJ. Power of unweighted and weighted versions of simultaneous and sequential multiple-comparison procedures. Psychol Bull 1995;118:300–307.

Koopman C, Rosario M, Rotheram-Borus MJ. Alcohol and drug use and sexual behaviors placing runaways at risk for HIV infection. Addict Behav 1994;19:95–103. [PubMed: 8197897]

Ku L, Sonenstein FL, Pleck JH. Factors influencing first intercourse for teenage men. Public Health Rep 1993;108:680–694. [PubMed: 8265752]

Li X, Feigelman S, Stanton B. Perceived parental monitoring and health risk behaviors among urban low-income African-American children and adolescents. J Adolesc Health 2000;27:43–48. [PubMed: 10867351]

MacDonald NE, Wells GA, Fisher WA, et al. High-risk STD/HIV behavior among college students. JAMA 1990;263:3155–3159. [PubMed: 2348524]

McFarlane AH, Bellisimo A, Norman GR. The role of family and peers in self-efficacy: links to depression in adolescence. Am J Orthopsychiatry 1995;65:402–410. [PubMed: 7485425]

Meschke LL, Zwieg JM, Barber BL, Eccles JS. Demographic, biological, psychological, and social predictors of the timing of first intercourse. J Res Adolesc 2000;10:315–338.

Metzler CW, Noell J, Biglan A, Ary D, Smolkowski K. The social context for risky sexual behavior among adolescents. J Behav Med 1994;17:419–438. [PubMed: 7966262]

Miller KS, Forehand R, Kotchick BA. Adolescent sexual behavior in two ethnic minority samples: the role of family variables. J Marriage Fam 1999;61:85–98.

Miller KS, Levin ML, Whitaker DJ, Xu X. Patterns of condom use among adolescents: the impact of mother–adolescent communication. Am J Public Health 1998;88:1542–1544. [PubMed: 9772860]

Moss R, Donenberg G (2003), The Information-Motivation-Behavioral Skills Model (IMB) of HIV-risk: its application to youth in psychiatric care. Poster accepted for presentation at the Biennial Meeting of the Society for Research on Child Development, Tampa, FL, April

Mulrine A (2002), Risky business: teens are having more sex—and getting diseases. But is telling them to wait the answer? *US News and World Report* May 27, pp 42–49

National Institute on Drug Abuse (1995), *Prevalence of Drug Use in the DC Metropolitan Area Adult and Juvenile Offender Populations: 1991.* Rockville, MD: USDHHS

Needle R, Fisher DG, Weatherby N, et al. Reliability of self-reported HIV risk behaviors of drug users. Psychol Addict Behav 1995;9:242–250.

Oregon Social Learning Center (1990), *Parental Monitoring and Supervision Constructs* (technical reports). Eugene: Oregon Social Learning Center (*http://www.oslc.org/*)

Ostrander R, Weinfurt KP, Yarnold PR, August G. Diagnosing attention deficit disorders using the BASC and the CBCL: test and construct validity analyses using optimal discriminant classification trees. J Consult Clin Psychol 1998;66:660–672. [PubMed: 9735584]

Paikoff RL. Early heterosexual debut: situations of sexual possibility during the transition to adolescence. Am J Orthopsychiatry 1995;65:389–401. [PubMed: 7485424]

Parker G. Parental characteristics in relation to depressive disorders. Br J Psychiatry 1979;134:138–147. [PubMed: 427329]

Parker G. Parental "affectionless control" as an antecedent to adult depression. Arch Gen Psychiatry 1983;40:956–960. [PubMed: 6615158]

Pequagnat W, Szapocznik J (2000), The role of families in preventing and adapting to HIV/AIDS: issues and answers. In: *Working With Families in the Era of HIV/AIDS,* Willo W, Szapocznik J, eds. Thousand Oaks, CA: Sage

Perrino T, Gonzalez-Soldevilla A, Pantin G, Szapocnik J. The role of families in adolescent HIV prevention: a review. Clin Child Fam Psychol Rev 2000;3:81–96. [PubMed: 11227063]

Remez L. Oral sex among adolescents: is it sex or is it abstinence? Fam Plann Perspect 2000;32:298–304. [PubMed: 11138867]

Resnick M, Bearman P, Blum R, et al. Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. JAMA 1997;278:823–832. [PubMed: 9293990]

Rey J, Plapp J. Quality of perceived parenting in oppositional and conduct disordered adolescents. J Am Acad Child Adolesc Psychiatry 1990;29:382–385. [PubMed: 2347834]

Rogers A. Voice, play, and a practice of ordinary courage in girls' and women's lives. Harv Educ Rev 1993;63:265–295.

Rollin SA, Rubin R, Marcil R, Ferullo U. Project KICK: a school-based drug education health promotion research project. Couns Psychol Q 1995;8:345–359.

Romer D, Black M, Ricardo I, et al. Social influences on the sexual behavior of youth at risk for HIV exposure. Am J Public Health 1994;84:977–985. [PubMed: 8203696]

Romer D, Stanton B, Galbraith J, Feigelman S, Black MM, Li X. Parental influence on adolescent sexual behavior in high-poverty settings. Arch Pediatr Adolesc Med 1999;153:1055–1062. [PubMed: 10520613]

Rotheram-Borus MJ, Koopman C. Sexual risk behaviors, AIDS knowledge, and beliefs about AIDS among runaways. Am J Public Health 1991;81:208–210. [PubMed: 1990862]

Rotheram-Borus MJ, Koopman C, Bradley J (1989), Barriers to successful AIDS prevention programs with runaway youth. In: *Troubled Adolescents and HIV Infection: Issues in Prevention and Treatment,* Woodruff JO, Doherty D, Athey JG, eds. Washington, DC: Georgetown University

Rotheram-Borus MJ, Rosario M, Reid H, Koopman C. Predicting patterns of sexual acts among homosexual and bisexual youth. Am J Psychiatry 1995;152:588–595. [PubMed: 7694909]

Ryan TA. Multiple comparisons in psychological research. Psychol Bull 1959;56:26–47. [PubMed: 13623958]

Sanderson CA, Cantor N. Social dating goals in late adolescence: implications for safer sexual activity. J Pers Soc Psychol 1995;68:1121–1134. [PubMed: 7608858]

Schaefer E. A configurational analysis of children's reports of parent behavior. J Consult Psychol 1965;29:552–557. [PubMed: 5846126]

Schludermann S, Schludermann E. Children's reports of parental behavior: an inventory. Child Dev 1970;36:413–424.

Schuster M, Bell R, Kanouse D. The sexual practices of adolescent virgins: genital sexual activities of high school students who have never had vaginal intercourse. Am J Public Health 1996;86:1570–1576. [PubMed: 8916522]

Schwartz IM. Sexual activity prior to coital initiation: a comparison between males and females. Arch Sex Behav 1999;28:63–69. [PubMed: 10097805]

Shaffer D, Fisher P, Lucas CP, Dulcan MK, Schwab-Stone ME. NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV): description, differences from previous versions, and reliability of some common diagnoses. J Am Acad Child Adolesc Psychiatry 2000;39:28–38. [PubMed: 10638065]

Shaffer D, Fisher P, Piacentini J, Schwab-Stone M, Wiks J (1991), *Diagnostic Interview for Children (DISC 2.3)-Child Version* New York: Columbia University

Sieving R, Resnick MD, Bearinger L, Remafedi G, Taylor BA, Harmon B. Cognitive and behavioral predictors of sexually transmitted disease risk behavior among sexually active adolescents. Arch Pediatr Adolesc Med 1997;151:243–251. [PubMed: 9080931]

Small SA, Luster T. Adolescent sexual activity: an ecological, risk-factor approach. J Marriage Fam 1994;56:181–192.

Soltysik RC, Yarnold PR (1993), *ODA 1.0: Optimal Data Analysis for DOS.* Chicago: Optimal Data Analysis

St Lawrence JS. African-American adolescents' knowledge, health-related attitudes, sexual behavior, and contraceptive decisions: implications for the prevention of adolescent HIV infection. J Consult Clin Psychol 1993;61:104–112. [PubMed: 8450095]

Stiffman AR, Cunningham R (1991), The epidemiology of child and adolescent mental health disorders. In: *National Association of Deans and Directors of Schools of Social Work,* Gibbs JT, ed. Berkeley: University of California Press

Stiffman AR, Dore P, Earls F, Cunningham R. The influence of mental health problems on AIDS-related risk behaviors in young adults. J Nerv Ment Dis 1992;180:314–320. [PubMed: 1583474]

Swadi H, Zeitlin H. Peer influence and adolescent substance abuse: a promising side? Br J Addict 1988;83:153–157. [PubMed: 3345392]

Szapocznik J, Coatsworth JD (1999), An ecodevelopmental framework for organizing the influences on drug abuse: a developmental model for risk and prevention. In: *Drug Abuse: Origins and Interventions,* Glantz M, Hartel CR, eds. Washington, DC: American Psychological Association, pp 331–366

Thomas G, Reifman A, Barnes GM, Farrell MP. Delayed onset of drunkenness as a protective factor for adolescent alcohol misuse and sexual risk taking: a longitudinal study. Deviant Behav 2000;21:181–210.

Upchurch D, Aneshensel C, Sucoff C, Levy-Storms L. Neighborhood and family contexts of adolescent sexual activity. J Marriage Fam 1999;61:920–933.

Urban Institute (2000), Reducing teen STD risk requires focus on a broader range of sexual activities (retrieved June 14, 2002 from *http://www.urban.org/Template.cfm? Section=ByTopic&NavMenuID=62&template=/TaggedContent/ ViewPublication.cfm&PublicationID=6955*)

Warren CW, Santelli JS, Everett SA, et al. Sexual behavior among US high school students, 1990–1995. Fam Plann Perspect 1998;30:170–172. [PubMed: 9711454]

Watters JK (1994), *Street Youth at Risk for AIDS* (final report). Rockville, MD: National Institute on Drug Abuse

Weatherby NL, Needle R, Cesari H. Validity of self-reported drug use among injection drug users and crack cocaine users recruited through street outreach. Educ Program Plann 1994;17:347–355.

Weisz JR, Weiss B. Assessing the effects of clinic-based psychotherapy with children and adolescents. J Consult Clin Psychol 1989;57:741–746. [PubMed: 2600245]

Werner-Wilson RJ. Are virgins at risk for contracting HIV/AIDS? J HIV/AIDS Prev Educ Adolesc Child 1998;2:63–71.

Whitaker D, Miller KS. Parent–adolescent discussions about sex and condoms: impact on peer influences of sexual risk behavior. J Adolesc Res 2000;15:251–273.

Whitbeck LB, Conger RD, Kao M. The influence of parental support, depressed affect, and peers on the sexual behaviors of adolescent girls. J Fam Issues 1993;14:261–278.

Whitbeck LB, Yoder KA, Hoyt DR, Conger RD. Early adolescent sexual activity: a developmental study. J Marriage Fam 1999;61:934–946.

Yarnold PR. Discriminating geriatric and non-geriatric patients using functional status information: an example of classification tree analysis via UniODA. Educ Psychol Meas 1996;66:656–667.

Yarnold PR, Soltysik RC (in press), *Optimal Data Analysis With Software for DOS and Windows.* Washington, DC: APA Books

Yarnold PR, Soltysik RC, Bennett CL. Predicting in-hospital mortality of patients with AIDS-related *Pneumocystis carinii* pneumonia: an example of hierarchically optimal classification tree analysis. Stat Med 1997;16:1451–1463. [PubMed: 9249918]
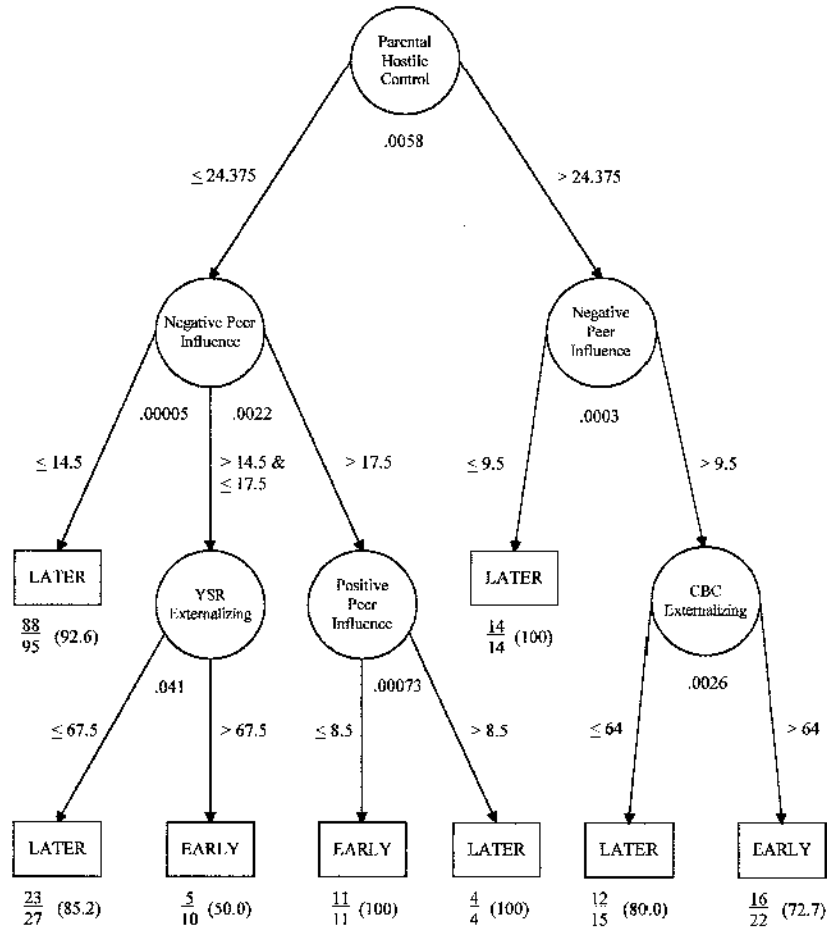
Fig. 1.
The Optimal Data Analysis (ODA) classification tree model for predicting early versus later sexual debut ($N = 198$). In this figure, circles represent nodes (or decision points), arrows represent branches (or predictive pathways), and rectangles represent prediction endpoints (or final classifications). Numbers beneath nodes are the generalized *p* value for each node. Numbers beside arrows indicate the value of the cut point for optimally classifying observations into categories for each node (or the ODA decision rule). Fractions beneath each prediction endpoint represent the number of correct classifications at the endpoint (numerator) and the total number of observations classified at the endpoint (denominator). Numbers in parentheses beside fractions are the predictive value for each endpoint (or the percentage of the predicted classifications into the given category that were correct). CBC = Child Behavior Checklist; YSR = Youth Self-Report.

TABLE 1

Univariate Associations of Predictors With the Absence (0) Versus Presence (1) of Early Sexual Debut for the Total Sample

Predictor	ODA Model	n	% Early Sexual Debut	Overall PAC (%)	p <
Age[a]	≤ 15.04, predict 0; >15.04, predict 1	100 117	11.0 35.9	60.4	.0001
Sex[a]	Male, predict 0; Female, predict 1	118 99	20.3 29.3	56.7	.16
Ethnicity[a]	White or Asian, predict 0; Black, Latino, biracial, or other, predict 1	81 136	17.3 28.7	48.8	.073
SES[a]	>4.5, predict 0; ≤4.5, predict 1	34 172	17.6 25.0	34.5	.51
Need for intimacy[a]	≤3.8, predict 0; >3.8, predict 1	97 92	18.6 35.9	59.3	.0088
Fear of rejection	≤ 1.1, predict 0; >1.1, predict 1	53 111	24.5 32.4	46.3	.37
Negative peer influence	≤ 13.5, predict 0; >13.5, predict 1	108 102	9.3 40.2	66.2	.0001
Need for achievement[a]	>10.5, predict 0; ≤ 10.5, predict 1	103 107	15.5 31.8	57.6	.0062
Positive peer influence[a]	>8.5, predict 0; ≤8.5, predict 1	114 93	17.5 28.0	58.0	.093
HIV/AIDS behavioral self-efficacy[a]	≤29.5, predict 0; >29.5, predict 1	127 58	18.9 32.8	66.0	.06
Youth-reported parental permissiveness[a]	≤9.5, predict 0; >9.5, predict 1	105 108	16.2 31.5	57.3	.011
Youth-reported parental monitoring[a]	>13.5, predict 0; ≤ 13.5, predict 1	133 76	17.3 36.8	66.0	.0024
Parental rejection[a]	<21.9, predict 0; ≥21.9, predict 1	123 85	19.5 30.6	60.1	.072
Parental positive involvement[a]	>19.4, predict 0; ≤ 19.4, predict 1	161 41	21.7 34.2	69.3	.11
Parental intrusiveness[a]	<19, predict 0; ≥ 19, predict 1	151 61	20.5 31.2	65.6	.11
Parental hostile control[a]	≤24.4, predict 0; >24.4, predict 1	153 55	19.0 38.2	69.7	.0059
Parent-reported monitoring[a]	>39.5, predict 0; ≤39.5, predict 1	116 70	19.0 31.4	62.4	.075
Youth-reported withdrawal[a]	≤61.5, predict 0; >61.5, predict 1	159 58	22.6 29.3	64.5	.38
Youth-reported somatic symptoms	≤52.5, predict 0; >52.5, predict 1	85 132	21.2 26.5	47.0	.43
Youth-reported anxiety/depression[a]	>59.5, predict 0; ≤59.5, predict 1	75 142	21.3 26.1	44.2	.51
Youth-reported social problems	>62.5, predict 0; ≤62.5, predict 1	41 176	12.2 27.3	38.7	.046
Youth-reported thought problems	≤53, predict 0; >53, predict 1	95 122	21.0 27.0	49.8	.35
Youth-reported attention problems[a]	>69.5, predict 0; ≤69.5, predict 1	34 183	11.8 26.8	36.4	.081
Youth-reported delinquent behavior[a]	≤60.5, predict 0; >60.5, predict 1	118 99	12.7 38.4	65.0	.0001
Youth-reported aggressive behavior	≤58, predict 0; >58, predict 1	118 99	16.1 34.3	61.3	.0025
Youth-reported self-destructive behavior	>62.5, predict 0; ≤62.5, predict 1	30 88	13.3 22.7	39.0	.31
Youth-reported total symptoms[a]	≤53.5, predict 0; >53.5, predict 1	64 153	12.5 29.4	46.5	.01
Youth-reported internalizing symptoms[a]	≤45.5, predict 0; >45.5, predict 1	42 175	14.3 26.9	38.2	.12
Youth-reported externalizing symptoms[a]	≤61.5, predict 0; >61.5, predict 1	130 87	15.4 37.9	65.9	.0002
Parent-reported child withdrawal	>65.5, predict 0; ≤65.5, predict 1	82 125	18.3 26.4	48.3	.24
Parent-reported child somatic symptoms[a]	≤58, predict 0; >58, predict 1	97 110	16.5 29.1	54.6	.034
Parent-reported child anxiety/depression[a]	≤53.5, predict 0; >53.5, predict 1	51 156	15.7 25.6	40.1	.19
Parent-reported child social problems	>56.5, predict 0; ≤56.5, predict 1	115 92	14.8 33.7	62.3	.0017

Predictor	ODA Model	n	% Early Sexual Debut	Overall PAC (%)	p <
Parent-reported child thought problems[a]	≤65.5, predict 0; >65.5, predict 1	120 87	17.5 31.0	60.9	.03
Parent-reported child attention problems	>54.4, predict 0; ≤54.4, predict 1	166 41	21.7 29.3	68.6	.31
Parent-reported child delinquent behavior	≤64.5, predict 0; >64.5, predict 1	125 82	12.8 39.0	68.1	.0001
Parent-reported child aggressive behavior	≤64, predict 0; >64, predict 1	117 90	17.1 31.1	60.4	.16
Parent-reported child total symptoms[a]	≤68.5, predict 0; >68.5, predict 1	130 77	19.2 29.9	61.8	.09
Parent-reported child internalizing symptoms	≤48.5, predict 0; >48.5, predict 1	16 191	0.0 25.1	30.9	.026
Parent-reported child externalizing symptoms	≤71.5, predict 0; >71.5, predict 1	164 43	17.7 44.2	74.4	.0006
Parental disengagement	≤ 11.5, predict 0; >11.5, predict 1	127 70	18.9 31.4	63.4	.055

Note: Decision rules tabled beneath "ODA Model" for each predictor are from univariable optimal discriminant analyses that maximize overall classification accuracy (Soltysik and Yarnold, 1993). Overall PAC = overall percentage of classification accuracy, or the percentage of the total sample correctly classified by the tree model. Nondirectional Fisher exact probability (*p*) is reported for illustrative purposes only, but is not considered in the Bonferroni α adjustment conducted for the final classification tree model (Fig. 1). When adopting a sequentially rejective Bonferroni-type multiple comparisons procedure to control for experiment-wise type I error (Soltysik and Yarnold, 1993), univariate effects above with generalized $p < .0006$ remain statistically significant. Samples sizes vary somewhat across predictors due to incomplete data for some participants. ODA = Optimal Data Analysis; SES = socioeconomic status; HIV = human immunodeficiency virus; AIDS = acquired immunodeficiency syndrome.

[a]ODA model was stable in "jack-knife" leave-one-out analysis assessing expected cross-sample generalizability.

TABLE 2

Classification Performance Summary for the Tree Model of Early Sexual Debut (*N* = 198)

Performance Index	Performance Parameter
Overall classification accuracy	173/198 (87.4%)
Sensitivity (later debut)	141/152 (92.8%)
Sensitivity (early debut)	32/46 (69.6%)
Effect strength for sensitivity	62.4%
Predictive value (later debut)	141/155 (91.0%)
Predictive value (early debut)	32/43 (74.4%)
Effect strength for predictive value	65.4%
Effect strength overall	63.9%

Cross-Classification Table

	Adolescents' Predicted Status	
Adolescents' Actual Status	Later Debut	Early Debut
Later Debut	141	11
Early Debut	14	32

Note: Overall classification accuracy is the percentage of the total sample correctly classified by the tree model. Sensitivity is a descriptive index that indicates the percentage of the actual members of a given category (e.g., the participants who reported early debut) correctly classified by the tree model. In classification tree analysis, effect strength is a standardized index for which 0 = performance expected by chance and 100 = perfect classification accuracy. For example, a sensitivity effect strength index of 62.4 means that the model yielded 62.4% of the theoretical possible improvement that could be achieved beyond chance, in terms of accurately classifying the members of the two early-debut categories. Effect strength values of 0.25 or less are considered weak, values greater than 0.25 and less than or equal to 0.5 are considered moderate, and values greater than 0.5 are considered strong (Yarnold and Soltysik, in press). Predictive value (or specificity) is a prognostic index that indicates the percentage of the predicted classifications into a given category that were correct. Effect strength overall is simply the mean of the effect strength for sensitivity and for predictive value, and it reflects the model's performance from both descriptive and prognostic perspectives.