

Predicting Risk for Pregnancy by Late Adolescence: A Social Contextual Perspective

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To evaluate a model of social contextual influences on risk for adolescent pregnancy, 368 target adolescents (52% female, 48% male) and their mothers, fathers, and closest age siblings were assessed 6 times over a 7-year period beginning when the target adolescents were in 7th grade. Two pathways were found to increase risk for involvement in a pregnancy by late adolescence. Middle adolescent risk-taking behavior mediated the influence of early adolescent parental warmth–involvement and deviant-peer affiliations on involvement in a pregnancy by 12th grade. Also, early adolescent academic competence mediated the relationship between parental warmth–involvement and involvement in a pregnancy by 12th grade. Theoretical and practical implications of the results are discussed.

The vast majority of research regarding adolescent pregnancy examines the social consequences of pregnancy for adolescents in terms of (a) decreased opportunities for education and economic advancement, (b) difficulties in attempts to raise children, (c) unavailability of social support networks for teen parents, and (d) the decision-making processes surrounding pregnancy (e.g., Davis, Rhodes, & Hamilton-Leaks, 1997; Furstenberg, Brooks-Gunn, & Chase-Lansdale, 1989; Murry, 1995; Wakschlag, Chase-Lansdale, & Brooks-Gunn, 1996). In addition, empirical research has begun to examine the consequences of having a teenage parent for the developmental outcomes of the young child (e.g., Serbin, Peters, & Schwartzman, 1996). Although researchers have a good understanding of many of the social and economic consequences surrounding adolescent pregnancy and parenthood, they know very little about the social and familial factors that increase risk for pregnancy during adolescence. Because of the noted negative consequences that adolescent pregnancy may have both for the adolescent and for the developing child, understanding the social and behavioral risks for adolescent pregnancy is of critical importance.

The goal of this investigation was to evaluate the degree to which elements in a proposed social contextual model would predict pregnancy by using prospective longitudinal data col-

lected from a sample of rural adolescents. Because both literatures provide insights regarding specific risks for early pregnancy, we begin by briefly reviewing the empirical research related to adolescent sexuality, followed by a summary of the findings from prospective studies on adolescent pregnancy. Finally, we describe our expectations based on these results as they relate to our conceptual model.

Adolescent Sexuality

Empirical research examining social and behavioral causes and correlates of adolescent sexuality may provide important clues as to the causes of adolescent pregnancy. Because not all adolescents who are sexually active become pregnant, however, the correlates of premarital sexual behaviors may not be exactly the same or may only partially overlap with the antecedents of adolescent pregnancy. Nevertheless, because sexual activity must precede pregnancy, correlates of adolescent sexuality are likely to be related to pregnancy as well.

There is remarkable convergence among investigations examining correlates and causes of the timing of first sexual intercourse. Interestingly, these studies vary considerably in terms of their methodological rigor, ranging from single-informant, cross-sectional surveys to very sophisticated prospective, longitudinal, multi-informant investigations. Yet, regardless of the study design, these investigations suggest that adolescent sexual activity is significantly affected by relationships within the social contexts most proximal to adolescents' daily activities (i.e., family, school, and peer relationships).

Research examining family influences on timing of first intercourse is scant in comparison with the amount of work investigating family influences on other adolescent risk-taking behaviors, such as the use of substances and delinquency. Although limited, this research suggests that disruptions within the family influence the timing of first intercourse. Specifically, as the number of transitions (e.g., divorce and remarriage) within the family context increase, the age at which adolescents experience first intercourse decreases (Capaldi, Crosby, & Stoolmiller, 1996). Because stressful family events such as divorce have been ar-

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gued to impede parents' abilities to maintain adequate involvement in the lives of their children (Conger, Patterson, & Ge, 1995; Patterson, Reid, & Dishion, 1992), it is not surprising that early timing of first sexual intercourse also is associated with low parental monitoring (Luster & Small, 1994). Adolescents who initiate first intercourse earlier than their peers also are more likely to have parents with permissive sexual attitudes and behaviors (Miller, McCoy, Olson, & Wallace, 1986; Udry & Billy, 1987; Whitbeck, Simons, & Kao, 1994). Taken together, these findings suggest that the events associated with family stress and disruption, parenting behaviors related to such events, parental views on sexuality, and parental sexual practices all relate to earlier initiation of sexual intercourse by adolescents.

Although empirical evidence linking problematic family relationships with timing of sexual intercourse is somewhat limited, an abundance of research has shown that adolescents' peer relationships and school behavior affect timing of first intercourse. Specifically, sexually active adolescents have been found to perform more poorly in school, to date earlier than their peers, and to have more friends who are supportive of sexual behaviors (Costa, Jessor, Donovan, & Fortenberry, 1995; Harvey & Spigner, 1995; R. Jessor, Costa, Jessor, & Donovan, 1983; Luster & Small, 1994; Rowe, Rodgers, Meseck-Bushey, & St. John, 1989; Udry & Billy, 1987). Given that adolescents spend a large portion of their time in the company of their friends and at school, it is not surprising that these social contexts have been linked to their sexual behavior.

The studies just reviewed suggest that the timing of sexual activity is influenced by family, school, and peer relationships such that turbulent family relationships, low parental involvement, poor school performance, and affiliations with deviant (or sexually tolerant) friends increase risk for early initiation into sexual activity. One additional pattern has been noted among sexually active teenagers. Namely, sexual activity during adolescence has been linked to risk-taking behavior more generally, such that sexually active teens also are more likely than their more conventional peers to be delinquent and to use substances (Capaldi et al., 1996; Costa et al., 1995; de Gaston, Jensen, & Weed, 1995; Harvey & Spigner, 1995; Luster & Small, 1994; Udry & Billy, 1987). Elliott and Morse (1989) reported that risk-taking behaviors, such as delinquency and substance use, precede initiation into sexual activity. Thus, models that explain adolescent risk-taking behavior in general also may be useful in predicting adolescent sexual behavior.

Although the correlates of adolescent sexual behavior and adolescent pregnancy may be similar, risk for pregnancy typically increases only when adolescents engage in unprotected sex. Thus, the antecedents of adolescent pregnancy may not necessarily be the same as the antecedents of sexuality in general. For instance, with maturation, premarital sex becomes more normative; however, for most adolescents, pregnancy does not. In other words, the vast majority of adolescents "survive" adolescence without becoming pregnant, but most do not survive without having engaged in sexual intercourse. We now turn to research that specifically addresses adolescent pregnancy.

Adolescent Pregnancy

The preponderance of empirical research on adolescent pregnancy focuses on its consequences rather than prediction. How-

ever, the small number of investigations that have attempted to predict risk of pregnancy have found some risk factors similar to those identified in research on adolescent sexuality, such as disruptions and difficulties in proximal social contexts. For instance, poor school performance (Smith, 1996) and problematic peer relationships during childhood (Underwood, Kuper-smidt, & Coie, 1996) have been linked to risk for pregnancy by late adolescence. In addition, risk-taking behaviors, such as conduct problems and substance use, have been found to predict adolescent pregnancy (Kovacs, Krol, & Voti, 1994; Smith, 1996).

In contrast to the adolescent sexuality research, a history of sexual abuse (Rainey, Stevens-Simon, & Kaplan, 1995; Smith, 1996; Stevens-Simon & McAnarney, 1996) or physical or emotional maltreatment (Smith, 1996) often precedes adolescent pregnancy. Adolescents with a history of abuse are nearly three times more likely than their nonabused peers to be trying to conceive (Rainey et al., 1995; Smith, 1996), suggesting that early pregnancy oftentimes may be intentional. Rainey et al. reported that sexually abused adolescents were more likely than nonsexually abused adolescents to have older boyfriends who were encouraging them to conceive. When sexual abuse involves a parent, it clearly represents severe dysfunction within the home environment. That is, children and adolescents who are victims of physical, emotional, or sexual abuse are likely to reside in homes that are dysfunctional and exploitive in multiple domains. Whereas a history of abuse is not identified as a risk factor for early pregnancy in the adolescent sexuality literature, family problems and family disruptions are.

A limitation of these findings, however, is that investigations examining risk factors associated with pregnancy during adolescence are restricted to samples of girls. We are aware of no longitudinal investigation that has examined risk factors associated with adolescent pregnancy that has also included boys. Because girls do not create pregnancies on their own, it is important to determine the social and behavioral factors that influence male and female involvement in pregnancy; therefore, we address this issue in the present study. With these empirical findings on adolescent risk for pregnancy and sexual involvement in mind, we turn to a discussion of the conceptual model that guides the present analyses.

A Social Contextual Model

The social contextual model presented in Figure 1 is derived from the literature just reviewed as well as from contemporary research and theory on adolescent deviance and risk taking that suggest that parenting behaviors such as warmth, encouragement, and consistency reduce the likelihood of child and adolescent risk-taking behaviors both directly (Path b) and indirectly through their influence on social contexts of developmental importance to adolescents (Conger, 1997; Conger & Simons, 1997; Elliott, Huizinga, & Menard, 1989; Gottfredson & Hirschi, 1990; Patterson et al., 1992). As shown in the model, we propose that these parental behaviors affect deviant-peer affiliations (Path a) and academic competence (Path c), which, in turn, relate to later risk-taking behavior (Paths d and e; see Conger, 1997; Conger & Simons, 1997; Scaramella, Conger, Spoth, & Simons, 1997; Simons, Johnson, Conger, & Elder, 1998). Con-

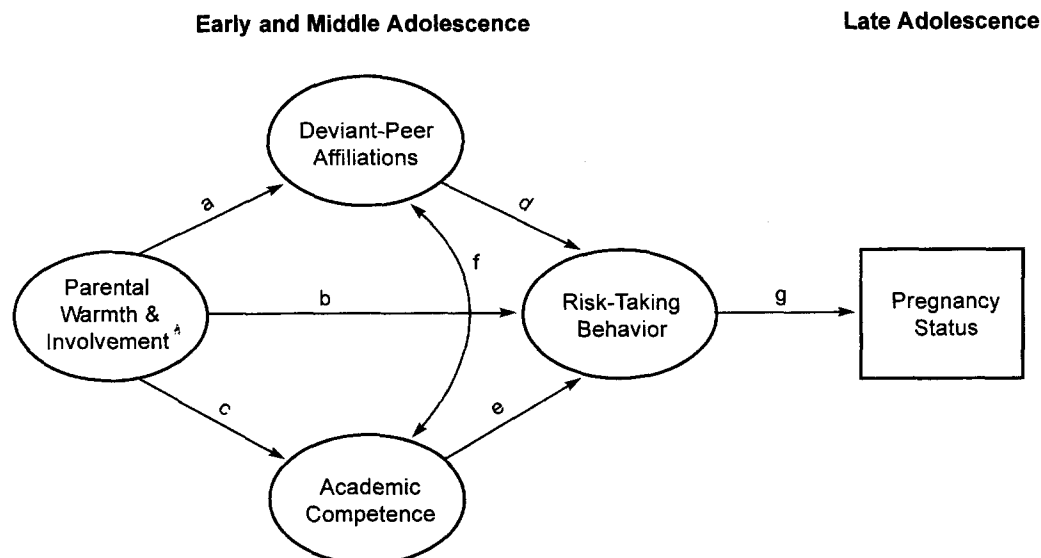


Figure 1. A social contextual model of risk for involvement in a pregnancy by late adolescence.

sistent with empirical research in this area, the social contexts in which adolescents function are expected to be interrelated such that difficulties in one domain (i.e., peer relationships) will be related to difficulties in another domain (i.e., academic competence [Path f]; Conger, 1997; Conger & Simons, 1997; Elliott et al., 1989; Gottfredson & Hirschi, 1990; Patterson et al., 1992; Thornberry, Lizotte, Krohn, Farnworth, & Jang, 1991). Thus, as suggested by the model, parenting behaviors that are characteristically warm and that demonstrate significant and appropriate involvement in adolescents' lives are expected to result in fewer deviant-peer affiliations, greater school success (defined here as academic competence), and less risk taking during adolescence. Finally, and consistent with the literature just reviewed, we hypothesized that risk-taking behavior would increase risk for pregnancy (Path g). The following section elaborates the theoretical rationale for the expected relationships depicted in Figure 1.

Parents have many opportunities to shape the various social contexts in which their children interact. Through the selection of neighborhoods in which their families live, schools their children attend, and encouragement of extracurricular activities in which their children participate (Bryant, 1985; Ladd, Profilet, & Hart, 1992; Parke & Bhavnagri, 1989), parents indirectly shape their children's social networks. That is, parents influence their children's social networks by structuring their children's social environments in ways that minimize opportunities to interact with peers who participate in or encourage activities of which parents do not approve. In addition to these indirect means, parents also directly shape and influence their children's social networks through interactions with their children. That is, parents who interact with their children in ways that involve consistent discipline, monitoring, and positive reinforcement in an atmosphere that conveys warmth and acceptance are expected to communicate clear guidelines for acceptable behavior and relationships. Furthermore, these parents are expected to re-

spond to children's transgressions in ways that reduce the likelihood of unacceptable behavior (e.g., Conger, 1997).

A growing body of empirical evidence supports the hypothesis that warm and involved parenting decreases risk for problems within children's primary social contexts, such as in their relationships with peers and their performance at school. Regarding social networks, recent investigations have linked parenting behaviors with deviant-peer affiliations during childhood and adolescence, such that more involved parents have children and adolescents with fewer deviant-peer relationships (Blackson, Tarter, Loeber, Ammerman, & Windle, 1996; Dishion, 1990; Fletcher, Darling, Steinberg, & Dornbusch, 1995; Kandel, 1996; Maggs & Galambos, 1993; Vuchinich, Bank, & Patterson, 1992; Warr, 1993). Interestingly, even though adolescents become increasingly autonomous and independent with age, empirical evidence suggests that parents continue to exert an influence on their adolescents' social relationships. For example, Gecas and Seff (1990) reported that, in general, parents maintain a greater influence on the lives of their adolescent children than do peers. Moreover, parents continue to have an influence on their adolescents' peer-group affiliations from early to late adolescence, such that parents often encourage adolescents to join one peer group over another (Brown, Mounts, Lamborn, & Steinberg, 1993). Consequently, although with maturation the manner in which parents influence their children's social relationships may change, parents maintain considerable influence on their children's social contexts and, in particular, on their children's peer relationships.

In addition to the expected influence of parenting on children's peer relationships, there is clear evidence that warm and involved parenting directly affects adolescent academic competence (Glasgow, Dornbusch, Troyer, Steinberg, & Ritter, 1997; Melby & Conger, 1996; Steinberg, Lamborn, Dornbusch, & Darling, 1992). For instance, Steinberg et al. reported that parenting that was warm and accepting, established clear limits and

expectations, and encouraged adolescents' independence resulted in greater academic success when this type of parenting was combined with involvement. That is, the benefits of such parenting behaviors on school performance were significantly enhanced when parents also were involved in their adolescents' school activities, were available to assist their adolescents with homework, and attended their adolescents' school functions. Thus, independent of parents' own intellectual skills, warm and involved parenting is expected to increase children's academic performance because such parenting positively reinforces adherence to academic demands.

The social contextual model also argues that the family context, through parents' efforts to structure and monitor their children's behaviors and social environments, affects the emergence of risk-taking behavior (see Figure 1). We proposed that children with highly warm and involved parents would be less involved in risk-taking behavior during adolescence, both because of the direct influences of this type of parenting and because of the indirect influences of parenting practices through children's peer and school environments (Conger & Simons, 1997; Patterson et al., 1992; Scaramella et al., 1997). As an extension of this model, we hypothesized that risk-taking behavior would mediate the relationship between the identified social contextual variables (family, school, and peers) and risk for involvement in a pregnancy. That is, we expected that adolescents who participated in risk-taking behaviors, such as using substances and being involved in delinquency, also would be at increased risk for involvement in a pregnancy. Although delinquency and substance use do not directly result in a pregnancy, these behaviors were expected to increase risk for involvement in a pregnancy because delinquency and substance use relate to a general tendency to endorse and engage in unconventional behaviors, such as early reckless (e.g., unprotected) or promiscuous sexual activities (Donovan & Jessor, 1985; Elliott & Morse, 1989; Gottfredson & Hirschi, 1990; S. L. Jessor & Jessor, 1975). In later analyses, structural equation modeling was used to test the empirical credibility of this proposed model.

Method

Sample

Data were collected annually as part of the Iowa Youth and Families Project. Participants included mothers, fathers, target adolescents, and siblings within 4 years of age of the target adolescents. These families participated in six waves of data collection over a 7-year period, beginning in 1989, when the target adolescents were in seventh grade. Approximately 89% of the original 451 families were still in the study in 1995 (1 year after completion of high school). Inclusion in this investigation required families to have complete data across the 7 years of assessments. Because of these stringent data requirements, a number of families were excluded from the analyses.

Exclusion from this investigation occurred for two primary reasons. In some instances, families had observational data missing because of equipment failures during in-home videotaping. These equipment failures occurred at random and accounted for approximately 50 of the missing cases. The remaining missing cases consisted of families who dropped out of the study or who continued to participate but opted not to participate during 1 of the years included in the present analyses. Two male adolescents and 1 female adolescent were excluded from the investigation because it was impossible to determine the pregnancy

status of the target adolescents (they reported being involved in a pregnancy 1 year and then reported never being involved in a pregnancy in subsequent years). Thus, the present analyses were based on a reduced sample of 368 adolescents (52% female, 48% male), their two biological parents, and their sibling closest in age. Mean comparisons of the adolescents included in the analyses with those excluded indicated that the parents of the excluded adolescents were significantly less educated (mean years of education = 13 for parents of excluded adolescents and 13.5 for parents of included adolescents) and were significantly less warm in their interactions with the target adolescents. No significant differences emerged for the remaining theoretical variables of interest.

Adolescents from the Iowa Youth and Families Project sample averaged 12 years 7 months of age in 1989. Because of the rural nature of the sample, in an area with almost no minority families, all participating families were White and were distributed along a socioeconomic continuum that ranged from below the poverty line to extremely well-to-do. Families resided on farms (34%), in nonfarm rural areas (12%), or in towns with a population of less than 6,500 (54%). Mean family income was \$33,700 when the target adolescents were in seventh grade. Families ranged in size from 4 to 13, with an average size of 4.94 members. In 1989, fathers averaged 40 years of age, and mothers averaged 38 years of age.

Procedure

Participating families were recruited through 34 public and private schools in eight adjacent counties in Iowa. All schools in towns with populations of less than 6,500 provided names and addresses of seventh-grade students and their parents. Families were first sent a letter explaining the study and later were contacted by telephone and asked to participate. Approximately 78% of eligible families agreed to participate.

At each year of data collection, all families completed questionnaires and participated in videotaped interaction tasks. Both observational and self-report assessments were used to measure the constructs of interest. Interviewers visited families on two separate occasions during each year of data collection. Each visit lasted approximately 2 hr. During the first visit, family members completed a series of questionnaires, some of which addressed parenting, adolescents' risk-taking behaviors, pregnancy status, peer relationships, and academic competence. During the second visit, which occurred within 2 weeks of the first visit, family members participated in four structured interaction tasks that were videotaped. These tasks were designed to elicit variations in family interaction and parenting behaviors. Only observations from the family interaction task (Task 1) were used in this investigation because this was the only interaction task that elicited the parenting behaviors of concern in these analyses. The family interaction task lasted approximately 35 min and involved a discussion addressing issues of daily living such as parenting, school performance, and household responsibilities. Trained observers coded interactions by using the Iowa Family Interaction Rating Scales (Melby et al., 1991).

Measures

To the extent possible, multiple indicators, including reports from more than one informant, were used to measure each of the constructs described in Figure 1. This strategy has been endorsed as a way of minimizing biases from a single informant (e.g., Bank, Dishion, Skinner, & Patterson, 1990; Lorenz, Conger, Simons, Whitbeck, & Elder, 1991). The measures are described in order from left to right in the model (see Figure 1).

Parental warmth and involvement. Observer ratings were used to assess parental warmth, supportiveness, and involvement. Observers rated mothers' and fathers' behaviors directed toward the target adoles-

cents during the family interaction task. To ensure that the analyses followed the temporal order proposed in the conceptual model (Figure 1), we used the scores for parenting generated in 1989, prior to the assessment of the endogenous constructs in the model. Parents' behaviors directed toward the target adolescents were rated by trained observers on a 5-point continuum ranging from 1 (*no evidence of the behavior*) to 5 (*the behavior is highly characteristic of the parent*). Each parent was rated in terms of his or her level of warmth (i.e., warmth, communication, quality time, encourages independence, prosocial behavior), hostility (reverse-coded; i.e., hostility, antisocial behavior, anger-coercion), and involvement or management (i.e., child monitoring, consistent discipline, positive reinforcement).

Scores were computed by summing the 11 behavioral ratings, and separate parenting scores were generated for mothers and fathers. Using mothers as an example, a high parenting score is indicative of a mother who is highly warm in her interactions with her adolescent, who communicates in a clear and consistent manner, who demonstrates an awareness of her adolescent's activities and feelings, who reinforces prosocial behavior, and who is consistent in her use of discipline. In contrast, such a mother would be unlikely to exhibit much hostility or anger in her interactions with her adolescent. This mother is described as demonstrating high warmth and involvement in her interactions with her adolescent. Cronbach's reliability coefficients indicated that these scores were internally consistent (mothers: $\alpha = .85$; fathers: $\alpha = .86$). Interobserver reliability based on 12% of the videotaped interactions was .81.

Because the fathers' and mothers' scales were highly correlated ($r = .63$), a latent warm-involved parenting construct was estimated with mothers' and fathers' scores as two separate indicators of the construct. A summary of the means and the standard deviations for parenting is provided in Table 1. Table 1 also provides this information for the other construct indicators in the model.

Deviant-peer affiliations. When target adolescents were in eighth grade, siblings and target adolescents answered several questions regarding the target adolescents' deviant-peer relationships. We used eighth-grade assessments for this measure to maintain the appropriate temporal order for the conceptual model (Figure 1), that is, following parenting but prior to assessments of risk taking and pregnancy. Siblings' and target adolescents' reports were used as separate indicators of the deviant-peers latent construct. Regarding siblings' reports, all siblings rated the following three statements in terms of how accurately each described the target children: "His or her friends get into a lot of trouble," "His or her friends sometimes break the law," and "His or her friends drink and smoke a lot." Target adolescents completed the first two items; however, they did not complete the item regarding their friends' smoking and drinking behavior. All items completed by siblings and target adoles-

cents were rated on a 5-point Likert scale, with higher scores indicating greater affiliation with deviant peers. The three sibling report items were summed to create a sibling report indicator of deviant-peer affiliations, and the two target-adolescent report items were summed to create a target-adolescent report indicator of deviant-peer affiliations. Cronbach's alpha coefficients indicated that these items were internally consistent (sibling report: $\alpha = .80$; target-adolescent report: $\alpha = .82$). As expected, siblings' and target adolescents' perceptions were highly correlated ($r = .31$).

Academic competence. To maintain consistency with the conceptual model (Figure 1), we also used eighth-grade reports of target adolescents' grade point averages. Two separate indicators were used to create the latent construct for academic competence: mothers' and target adolescents' reports of the target adolescents' grades. Grade point averages were rated on a 12-point scale (12 = A, 11 = A-, 10 = B+, . . . 3 = D, 2 = D-, 1 = F) and ranged from A to F. The two indicators were highly correlated ($r = .87$).

Risk-taking behavior. Again following the causal ordering proposed in the conceptual model, target adolescents' reports of delinquency and substance use in 9th and 10th grades were used as four indicators of the latent construct for risk-taking behavior. With regard to substance use, target adolescents rated 12 items indicating their frequency of using various substances such as alcohol, tobacco, and illegal drugs (e.g., marijuana, crack, and amphetamines). Use was rated on a 5-point Likert scale ranging from 0 (*never*) to 4 (*three or more times per week during the past year*). Scores were created by summing the 12 items; thus higher scores are indicative of greater substance use. These summed indicators were highly correlated ($r = .71$). Because the distributions of these scores were skewed, a log transformation was used in the analyses.

To measure delinquency, adolescents completed 23 items adapted from the National Youth Survey (Elliott, Huizinga, & Ageton, 1985; Elliott et al., 1989) regarding their involvement in delinquent activities during 9th and 10th grades. These items also were rated on a 5-point Likert scale ranging from 0 (*never*) to 4 (*six or more times during the past year*). Severity of the delinquency items ranged from status offenses (e.g., cut class, ran away from home) to serious or violent offenses (e.g., robbery, attacking someone with a weapon). Delinquency scores were created by summing the 23 items; higher scores indicate greater involvement in delinquent activities. Because the distributions of these scores also were skewed, a log transformation of the 9th- and 10th-grade delinquency scores was used to measure delinquency.

Pregnancy status. Beginning in 9th grade, adolescents were asked whether they had been involved in a pregnancy during the previous 12 months. During 12th grade, adolescents were asked if they had ever been involved in a pregnancy. In 9th grade, only 3 adolescents reported being involved in a pregnancy. These adolescents were excluded from the analyses because during the subsequent assessments, they reported never having been involved in a pregnancy. Thus, all pregnancies that occurred during the high school years (range: 10th through 12th grades) were scored positively for involvement in a pregnancy. Although men cannot give birth, if a young man in the sample believed that he was the father of a child conceived during this time period, he was considered to be involved in a pregnancy. Thirty-nine adolescents (11%) reported being involved in a pregnancy during their high school years; however, 5 of these adolescents (3 girls, 2 boys) were excluded because of missing data for other constructs in the model. Involvement in a pregnancy was coded as 1 ($n = 34$), and never being involved in a pregnancy was coded as 0 ($n = 334$). The age at which adolescents reported being involved in a pregnancy ranged from 15 to 19 years, and none of these adolescents were married.

Of the 34 adolescents who reported being involved in a pregnancy during their adolescent years, 14 of these adolescents (8 female, 6 male) kept their babies and were actively involved in raising their children. The

Table 1
Summary of the Means and Standard Deviations of the Indicators Used to Create the Latent Constructs

Independent variable	<i>M</i>	<i>SD</i>
Parental warmth and involvement: Fathers	36.91	5.95
Parental warmth and involvement: Mothers	38.74	5.81
Deviant-peer affiliations: Sibling report	5.02	2.47
Deviant-peer affiliations: Target report	3.11	1.66
Academic competence: Mother report	7.92	2.40
Academic competence: Target report	9.19	2.15
Delinquency in 9th grade: Target report	0.52	0.73
Substance use in 9th grade: Target report	0.71	0.89
Delinquency in 10th grade: Target report	0.58	0.77
Substance use in 10th grade: Target report	0.99	0.93

Note. The log transformations of the delinquency and substance use means are presented. $N = 368$. Target = target adolescent.

rate of childbearing among White, unmarried 15–19-year-old women is 4% nationally (U.S. Bureau of the Census, 1993), the same as the rate found in this sample. Unfortunately, comparable statistics for rates of pregnancy are not collected.

Results

Data analyses proceeded in several steps. First, the intercorrelations among the construct indicators (see Table 2) produced suggestive evidence that was consistent with the theoretical model. For example, mothers' parenting was positively related to target adolescents' reports of academic competence ($r = .28$), which, in turn, were negatively related to 10th-grade substance use ($r = -.17$) and pregnancy involvement by 12th grade ($r = -.16$). Based on these promising findings, the second step was to examine the associations among the identified latent variables and the index of pregnancy involvement to ensure that these variables were correlated as expected at the level of theoretical constructs. Next, using LISREL 8.14 (Jöreskog & Sörbom, 1993), we tested the hypothesis that risk-taking behavior would mediate the influence of the identified social contexts on pregnancy status by estimating a series of nested structural equation models. Finally, the social contextual model was used to predict actual childbearing ($n = 14$), and adolescents who reported being involved in a pregnancy but who did not become parents ($n = 20$) were excluded from these analyses. This final test of the model is important for describing the social contextual characteristics of adolescents who are raising the next generation of children.

First, all analyses were conducted separately by adolescent gender; however, the same pattern of results was obtained in each case. Thus, only the results for the combined sample are reported. In addition, in all structural equation analyses, the influence of parents' education was controlled statistically. The effects of parental income also were controlled; however, parental income did not significantly influence the relationships among the latent variables in any of the models tested. For that reason, parental income was not used as a control variable in the following analyses. Because the criterion variable, pregnancy status, was dichotomous, structural models were estimated using

weighted least squares. Weighted least squares estimation relies on polychoric correlation matrices and is appropriate when using a dichotomous dependent variable or when variables are not normally distributed, as with the substance use and delinquency variables (Bollen, 1989).

Table 3 provides the correlations among the exogenous and endogenous variables in the conceptual model (Figure 1). Except for pregnancy status, correlations among latent variables were estimated by multiple indicators. As expected, parental warmth and involvement, observed when adolescents were in 7th grade, was significantly and negatively correlated with deviant-peer affiliations ($r = -.30$) and significantly and positively related to academic competence ($r = .38$) 1 year later. Parental warmth and involvement also was significantly and negatively related to 9th- and 10th-grade risk-taking behavior ($r = -.28$) and pregnancy status by 12th grade ($r = -.16$). Thus, parents who were characterized as warm and involved in their interactions with their 7th-grade adolescents had children who were less likely to associate with deviant peers in 8th grade, who were less likely to be involved in risky behaviors during 9th and 10th grades, who were less likely to become pregnant by 12th grade, and who were more likely to perform well in school in 8th grade.

Deviant-peer affiliations and academic competence were significantly and negatively related, suggesting that adolescents who were more academically competent had fewer deviant-peer relationships in eighth grade. The deviant-peer affiliations and academic competence constructs also were significantly related to risk-taking behavior and pregnancy status (see Table 3). Thus, adolescents who associated with deviant peers and who performed poorly in school were at greater risk for engaging in risk-taking behaviors and also for being involved in a pregnancy by late adolescence. Importantly, using substances and participating in delinquent activities during middle adolescence (the risk-taking behavior construct) significantly increased risk for pregnancy by late adolescence ($r = .34$).

As noted, the next step in analyzing these data was to test the mediational hypotheses in the social contextual model by using a series of nested model comparisons. Table 4 describes

Table 2
Correlations Among the Indicators Used to Create the Latent Constructs

Independent variable	1	2	3	4	5	6	7	8	9	10	11
1. Parental warmth and involvement: Fathers	—										
2. Parental warmth and involvement: Mothers	.63**	—									
3. Deviant-peer affiliations: Sibling report	-.14**	-.18**	—								
4. Deviant-peer affiliations: Target report	-.07	-.12*	.31**	—							
5. Academic competence: Mother report	.27**	.29**	-.24**	-.25**	—						
6. Academic competence: Target report	.26**	.28**	-.21**	-.19**	.87**	—					
7. Delinquency in 9th grade: Target report	-.11*	-.13*	.17**	.25**	-.13**	-.11*	—				
8. Substance use in 9th grade: Target report	-.14**	-.23**	.31**	.21**	-.16**	-.15**	.56**	—			
9. Delinquency in 10th grade: Target report	-.12*	-.14**	.21**	.28**	-.19**	-.16**	.63**	.46**	—		
10. Substance use in 10th grade: Target report	-.12*	-.20**	.22**	.15**	-.19**	-.17**	.47**	.71**	.50**	—	
11. Involvement in a pregnancy	-.09†	-.09	.08	.06	-.15**	-.16**	.15**	.20**	.14**	.17**	—

Note. The log transformations of the delinquency and substance use scores were used in the present correlational analyses. $N = 368$. Target = target adolescent.

† $p < .10$. * $p < .05$. ** $p < .01$.

Table 3
Correlations Among the Latent Variables in the Social Contextual Model

Study variable	1	2	3	4	5
1. Parental warmth and involvement	—				
2. Deviant-peer affiliations	-.30	—			
3. Academic competence	.38	-.37	—		
4. Risk-taking behavior	-.28	.49	-.23	—	
5. Pregnancy status	-.16	.16	-.25	.34	—

Note. For all reported correlations, $p < .01$. Except for pregnancy status, estimates involve latent variables with multiple indicators.

the results of these nested model comparisons. The first model tested was a baseline model (Model 1). In this model, indicators were allowed to load on theoretical variables, but none of the paths linking the constructs were estimated. As expected, this model provided a poor fit with the data and was highly significant, $\chi^2(55, N = 368) = 244.05, p < .001$. In addition to the chi-square statistic, the critical N (CN) also was examined to determine model fit. As compared with the chi-square statistic, the CN index is less sensitive to sample size, and a CN greater than 200 is indicative of a good model fit (Hoelter, 1983). As shown in Table 4, the CN generated from the baseline model was far less than this acceptable criterion. Next, the theoretical model depicted in Figure 1 was estimated (Model 2). As described in Table 4, this model provided a good fit with the data, $\chi^2(45, N = 368) = 34.79, CN = 739.02$, and was a very significant improvement over the baseline model, $\Delta\chi^2(10, N = 368) = 209.26, p < .001$.

To ensure proper model specification, a series of models was compared with the social contextual model (Model 2). The direct paths from the exogenous variables (i.e., parenting, deviant-peer affiliations, and academic competence) were freed one at a time. For Model 3A, all paths depicted in Figure 1 were estimated, and the direct path was added from 7th-grade parenting to 12th-grade pregnancy status. As indicated by the nonsignificant change in chi-square, this model did not fit the data better than the theoretical model. Similarly, freeing the path from deviant-peer affiliations to pregnancy status did not improve on the prediction from the theoretical model that peer relations would be indirectly related to pregnancy through risk-taking behaviors (Model 3B). The estimation of the direct path from academic competence to pregnancy status, however, resulted in

a marginally significant improvement over the theoretical model (Model 3C). Finally, a fully recursive model was estimated in which the direct influences of parenting, deviant-peer affiliations, and academic competence on pregnancy status were estimated in addition to the paths depicted in Figure 1. This model did not result in a significant improvement in chi-square (see Table 4).

These results indicate that the model that best fitted the data was one that included the variables described in the theoretical model (Figure 1) plus the direct path from academic competence to pregnancy status. That is, the prediction that the influence of the three social contextual variables would be indirect through risk-taking behaviors was supported with the exception of academic competence. Figure 2 describes the final model that best fitted the data. It is important to note that all factor loadings were statistically significant and that the effects of parental education were statistically controlled. As with all of the models tested, the residuals for the deviant-peer affiliations and academic competence constructs were correlated ($\Psi = -.22$).

With one exception, the pattern of significant path coefficients was consistent with our theoretical expectations (see Figure 2). The direct path from academic competence to pregnancy status ($\beta = -.11$) was unexpected. Seventh-grade parenting was significantly and negatively associated with later deviant-peer affiliations ($\beta = -.19$) and risk-taking behavior ($\beta = -.13$) and was significantly and positively associated with academic competence ($\beta = .24$). Interestingly, the correlation between parenting and risk taking was reduced from $-.28$ (Table 3) to the path coefficient of $-.13$ (Figure 2) once the effects of deviant-peer affiliations on risk-taking behavior were considered. This

Table 4
Evaluation of the Social Contextual Model and Alternative Nested Models ($N = 368$)

Model	Causal paths added	χ^2	df for χ^2	$\Delta\chi^2$	Δdf for $\Delta\chi^2$	Critical N
1. Baseline model	No paths among factors	244.05***	55			124.75
2. Social contextual model	All paths depicted in Figure 1	34.79	45	209.26***	10	739.02
3. Comparisons with social contextual model						
A. Parenting effects	Parenting \rightarrow Pregnancy path	34.75	44	0.04	1	726.72
B. Deviant-peer effects	Deviant peer \rightarrow Pregnancy path	34.50	44	0.29	1	731.91
C. Academic effects	Academic competence \rightarrow Pregnancy path	32.02	44	2.77†	1	788.53
4. Fully recursive model	All direct and indirect paths	30.29	42	4.50	3	690.66

† $p < .10$. *** $p < .001$.

Early and Middle Adolescence

Late Adolescence

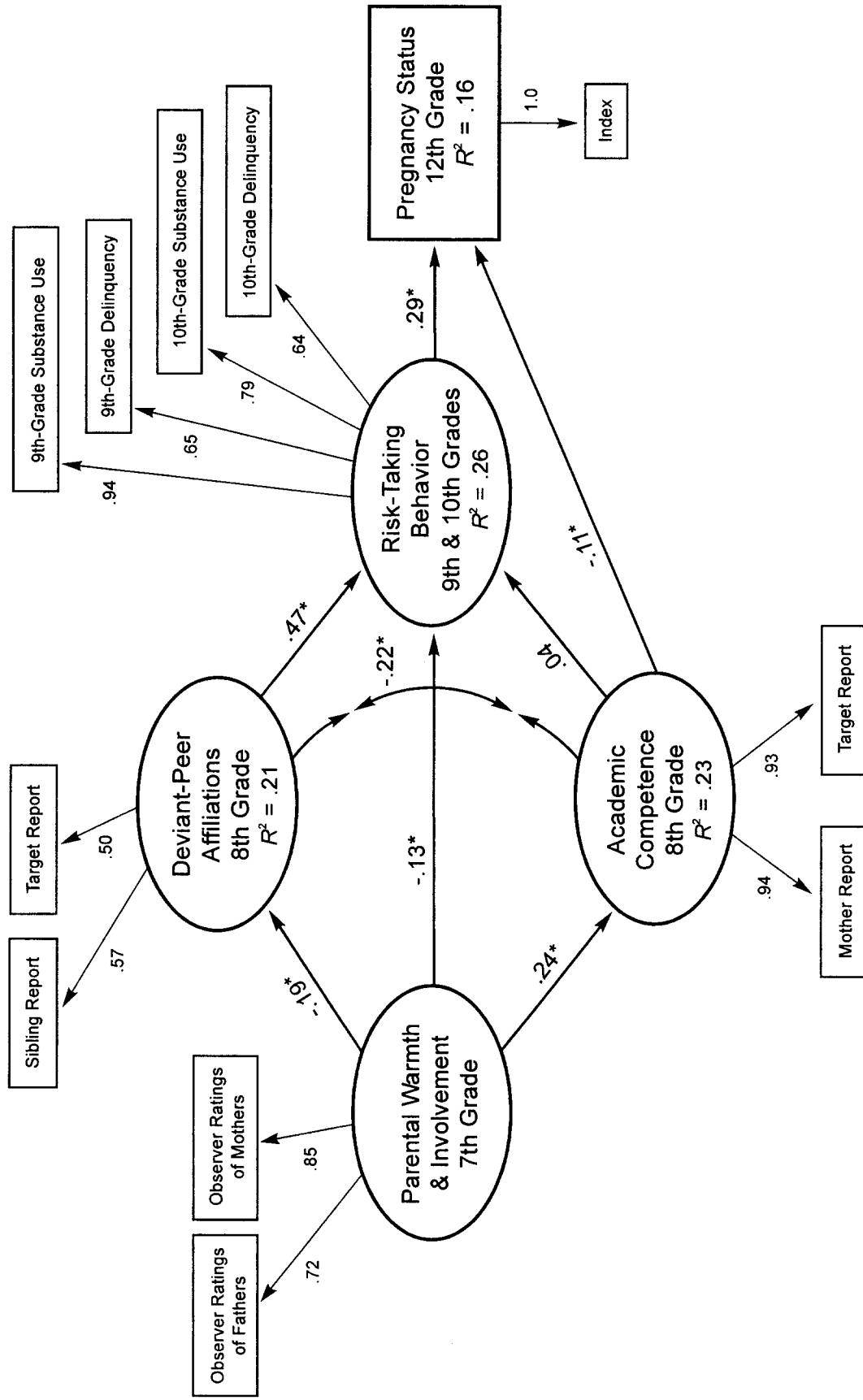


Figure 2. Results for the structural equation analyses (standardized regression coefficients) evaluating the social contextual model, controlling for parents' education. $\chi^2(44, N = 368) = 32.02, p = .91$; critical $N = 788.53$; adjusted goodness of fit = .99. * $p < .05$.

indirect effect was statistically significant, $t(1) = -1.69$ (one-tailed test), suggesting that deviant-peer affiliations partially explained the association between parenting and risk-taking behavior. As expected, risk-taking behavior significantly predicted involvement in a pregnancy by 12th grade. Significant indirect effects also emerged for parenting, $t(1) = -3.33$, and deviant-peer affiliations, $t(1) = 3.17$, on pregnancy status, also consistent with the mediational pathways proposed by the social contextual model.

Contrary to expectations, the association between academic competence and involvement in a pregnancy was not mediated by risk-taking behavior. In fact, once the effects of parenting and deviant-peer affiliations on risk taking were estimated, the previously significant zero-order relationship between academic competence and risk-taking behavior ($r = -.23$; Table 3) was reduced to .04 in the structural model. It is important to note that academic competence and deviant-peer affiliations were significantly related. Instead of the hypothesized indirect effect of academic competence on involvement in a pregnancy, a significant direct effect emerged.

Finally, to determine how well the theoretical model predicted actual parenthood, the structural equation model presented in Figure 2 was estimated again by excluding the 20 adolescents who reported pregnancies but did not become parents. These analyses were based on a reduced sample of 348 adolescents, 14 of whom were directly involved in raising their children. The results were replicated; however, the path from academic competence to parenthood status was not significant. Because of the small number of adolescents who opted to parent their children, these results should be interpreted with considerable caution.

Discussion

Most of the empirical research concerning adolescent pregnancy examines the social consequences associated with early pregnancy. In this investigation, we switched the focus from the consequences of pregnancy to the evaluation of a set of social contextual variables that were expected to influence risk for adolescent pregnancy. Because prospective longitudinal data were available from 7th to 12th grades for a cohort of rural adolescents, it was possible to predict pregnancy status across time. The social contextual model is based on theoretical and empirical research in the areas of adolescent sexuality and pregnancy as well as on more general theories of adolescent deviance. The findings generated from the test of the social contextual model were generally consistent with our expectations; however, some important inconsistencies were noted. We begin by briefly reviewing our expectations derived from the social contextual model and then describe the results that were consistent and inconsistent with these theoretical postulations. Finally, we conclude by describing the limitations of this investigation and also the implications for theory development and future research.

A Social Contextual Approach to the Prediction of Adolescent Pregnancy

Because the primary goal of this investigation was to determine whether a model designed to explain adolescent risk-taking be-

havior in general would also explain risk for involvement in a pregnancy during adolescence, it was important to establish whether the social contextual model actually explained risk-taking behavior during this time period. Theoretically, we expected that warm and involved parenting would influence involvement in risk-taking behavior in two ways. First, we expected that uninvolved parents, as compared with involved parents, would be less aware of their children's activities and, consequently, would be less able to respond appropriately to their children's risk-taking activities. The significant and direct path from parenting to risk-taking behavior in the final model supported this notion. Second, we expected that unaffectionate and uninvolved parenting behaviors would indirectly increase risk-taking behavior by influencing the peer and school contexts in which adolescents function. Some support for this mediational hypothesis emerged. Specifically, parental warmth and involvement resulted in fewer relationships with deviant peers, relationships that exacerbated risk-taking behaviors. Moreover, the indirect effect from parenting to risk taking through deviant peers was statistically significant. Although these same parenting behaviors were found to increase academic competence, in the full structural model academic competence was not related to risk-taking behavior. This result was inconsistent with the second proposed mediational pathway from parenting to risk taking.

Importantly, the pattern of significant associations among the social contextual variables and adolescent risk-taking behavior is, in large part, consistent with theory and empirical research on adolescent deviance (e.g., Conger, 1997; Conger & Simons, 1997; Elliott et al., 1989; Gottfredson & Hirschi, 1990; Kandel, 1996; Patterson et al., 1992; Simons et al., 1998; Thornberry et al., 1991; Vuchinich et al., 1992). Because our social contextual model was derived from this literature, as well as from earlier findings regarding adolescent sexuality and pregnancy risk, we expected to find results that would contribute to more general issues regarding deviant or risky activities. These supportive results increase confidence in the predictive validity of the proposed social contextual model.

A third mediational process proposed in the social contextual model (Figure 1) predicted that the effects of parenting, deviant-peer affiliations, and academic competence on pregnancy status all would be indirect through risk-taking behavior. This hypothesis followed from earlier empirical research suggesting that risk-taking behaviors, such as substance use and delinquency, often precede initiation or escalation of sexual activity (Elliott & Morse, 1989). Thus, risk-taking behavior was expected to be the critical link between the identified social contextual variables and involvement in a pregnancy. Consistent with our expectations, risk-taking behavior mediated the relationship between parenting and risk for involvement in a pregnancy. That is, warm and involved parenting behaviors, observed when adolescents were in seventh grade, reduced adolescents' risk for involvement in a pregnancy to the degree that these parenting behaviors either directly or indirectly (through deviant-peer affiliations and academic competence) reduced adolescents' involvement in risky behaviors. In addition, the association between deviant-peer affiliations and risk for involvement in a pregnancy was entirely indirect through risk-taking behaviors. Specifically, the findings suggest that associating with deviant peers increases risk for adolescent pregnancy only to the degree that deviant

peers promote risky behaviors. The mediational hypothesis was not supported with regard to academic competence. Instead, academic competence was directly predictive of involvement in a pregnancy even after the effects of parent education, parenting, deviant peers, and risky behaviors were statistically controlled. On this count, the findings contradict the theoretical framework and call for its revision in terms of academic competence.

In general, these results are consistent with the social contextual model and suggest two general pathways through which early parenting behaviors may increase or decrease risk for involvement in a pregnancy. One pathway can be described as a deviance pathway and suggests that involvement in a pregnancy is a consequence of a general tendency toward deviance. Characteristically, these adolescents seem to have conflictual relationships with their parents and have relationships with peers who are supportive of risk-taking activities during early adolescence. By middle adolescence, these youth are involved in risk-taking behaviors that promote early sexual activity (e.g., Capaldi et al., 1996; Elliott & Morse, 1989), thereby increasing risk of pregnancy by late adolescence. That is, association with deviant peers and participation in risk-taking behaviors likely increase the chance of involvement in a pregnancy because these adolescents probably generalize their behaviors to include risky sexual activity (e.g., frequent and unprotected sexual intercourse). This pathway is consistent with previous research examining risk-taking behaviors, such as substance use and delinquency (e.g., Patterson et al., 1992; Thornberry et al., 1991; Warr, 1993), and is consistent with expectations from our proposed social contextual model. This deviancy trajectory needs to be more fully evaluated in future studies.

The other pathway is one that can be described as a competency pathway. Adolescents on this pathway are characterized by warm and supportive relationships with their parents during early adolescence. These adolescents demonstrate success in school, thereby decreasing their risk for being involved in a pregnancy during middle and late adolescence. Perhaps warm and involved parenting behaviors create an environment that is sensitively attuned to the needs of developing adolescents and that encourages autonomy and responsibility among adolescents (e.g., Steinberg, Elmen, & Mounst, 1989). Such an environment not only may be beneficial for monitoring children's academic performance and promoting adherence to school demands but also may promote a more general sense of competence and responsibility among adolescents such that they may be more inclined either to delay sexual activity or to use the necessary means to prevent a pregnancy. Alternatively, as argued by Gottfredson and Hirschi (1990), academically competent adolescents may be more likely to consider the consequences of their actions both because of their increased intellectual skill and because of the increased opportunities associated with academic success and competence. Thus, academic competence may decrease risk for pregnancy because for academically skilled adolescents, an unexpected pregnancy may be more costly in that it disrupts and jeopardizes current and future opportunities and rewards. Future research examining these links is clearly needed.

Implications for the Next Generation

Although the quality of parenting experienced during early adolescence was found to predict adolescents' functioning in

peer and school contexts, what has not been considered here are the implications of early pregnancy for the next generation of children. This issue was examined through analyses that tested the social contextual model in terms of its ability to predict which adolescents would have and keep a child. Although these results should be interpreted with caution because of the small sample size (only 14 adolescents were raising children), the results were most supportive of the deviance pathway just described. That is, when only those adolescents who became parents were considered, academic competence was not a significant predictor. Instead, these young parents were more likely to have resided in homes that lacked parental warmth and involvement, to have affiliated with deviant peers during early adolescence, to have used substances, and to have participated in delinquent activities during middle adolescence. This combination of deviant history and poor child rearing makes it very unlikely that these young parents will have the necessary resources available to assist them with their early transition to parenthood. Moreover, these adolescents are perhaps the least prepared to assume child-rearing responsibilities, in part because they have not been exposed to sensitive and involved parenting, the type of parenting most conducive to the development of competence during early childhood.

Much of the early childhood literature suggests that parents who are consistent in their disciplinary practices and who respond sensitively and warmly to the needs of their infants and young children are more likely to have children who internalize their standards (Grusec & Goodnow, 1994; Kochanska, 1995), who have secure attachment relationships (De Wolff & van IJzendoorn, 1997; Lyons-Ruth, Alpern, & Repacholi, 1993; Stevenson-Hinde & Shouldice, 1995), who demonstrate cognitive competence (Fagot & Gauvain, 1997), and who exhibit few behavior problems during preschool and middle childhood (Campbell, 1995; Keenan & Shaw, 1997). In other words, warm and involved parenting seems to result in favorable outcomes for children, at any age. The results from this investigation suggest that adolescents who bear children (as well as those involved in a conception) are less likely than other adolescents to have been exposed to such parenting. In addition, these adolescents may have created a particularly problematic environment in which their most proximal sources of social influence involve other adolescents or young adults who engage in similarly risky behaviors. Clearly, these results suggest that these young parents are at high risk for raising a generation of children who are likely to replicate their parents' social and behavioral problems. It seems that preventative interventions during the adolescent years designed to increase parental warmth-involvement and academic competence and to decrease affiliations with deviant peers and involvement in risk-taking behavior may help to reduce risk for both teen pregnancy and the intergenerational transmission of problem behaviors.

Other Issues

Several limitations of this study should be noted. First, only a small portion of the sample reported being involved in a pregnancy; even fewer actually became parents. Additional research that uses larger samples of adolescents and that assesses adolescents prior to a pregnancy is clearly needed. Second, this

sample consisted entirely of White families with two biological parents living in the rural Midwest. Thus, additional research involving more diverse samples in terms of ethnicity, geographic location, and family structure also is important. Finally, the social contextual model suggests that parents directly influence and shape their children's social environments. Alternatively, parents could be responding to changes in children's behaviors and environments. That is, adolescents who experience school failure and who affiliate with deviant peers may cause parents to become decreasingly warm and involved. These possibilities require further investigation.

Although we acknowledge these limitations, this study addressed several problems in the current research on adolescent pregnancy. A clear strength of this investigation is the use of a longitudinal, multi-informant design. Thus, we were able to identify social contextual variables that preceded risk for involvement in a pregnancy by late adolescence. The multi-informant design also increases our confidence that these findings are less likely to be biased by method variance confounds (Bank et al., 1990; Kandel, 1996; Lorenz et al., 1991). Indeed, parenting behaviors were measured by observer ratings during a structured interaction task. Deviant-peer affiliations relied on both target adolescents' and siblings' reports, and academic competence was based on indicators obtained from mothers' and adolescents' reports. Only the risk-taking behavior construct and the involvement in a pregnancy variable were based solely on adolescents' self-reports. With regard to the risk-taking construct, we believe that assessing these behaviors over a 2-year period resulted in a more stable assessment of a tendency toward risky behaviors.

An additional strength of the present investigation is the inclusion of both boys and girls. Most of the previous research examining adolescent risk-taking behavior was conducted with all-male samples (see Caspi, Lynam, Moffitt, & Silva, 1993, for an important exception). In contrast, previous research examining causes and correlates of adolescent pregnancy relied on samples of girls. Indeed, we are aware of no investigation that also included boys in a sample of pregnancy involvement. In this investigation, we included variables commonly used to describe risk-taking behavior of boys to predict involvement in a pregnancy, an area of research almost exclusively focused on girls. The results of this investigation suggest that risk-taking behavior models may be valid for describing not only risk for involvement in a pregnancy but also other problematic behaviors by girls. Future research would clearly benefit by including both boys and girls, not only in studies of pregnancy risk but also in studies of risk-taking behavior more generally.

In sum, these results have clear implications for future research and theory development in the area of adolescent pregnancy and childbearing, as well as for theory development in the area of adolescent risk-taking behavior. Although additional research that replicates these findings with a larger sample of adolescents is needed, these results suggest that the social contextual model may provide a valid framework for understanding risk for adolescent pregnancy.

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- articles focused on emotion dealing with not only the psychological, social, and biological aspects of emotion, but also neuropsychological and developmental studies.

Please note that the P&C Board encourages participation by members of underrepresented groups in the publication process and would particularly welcome such nominees. Self-nominees are also encouraged.

To nominate candidates, prepare a statement of one page or less in support of each candidate. The members of the search committee are Janet Shibley Hyde, PhD (search chair); Joseph J. Campos, PhD; Richard J. Davidson, PhD; Hazel R. Markus, PhD; and Klaus R. Scherer, PhD.

Address all nominations to:

Janet Shibley Hyde, PhD, **Emotion** Search Chair
 c/o Karen Sellman, P&C Board Search Liaison
 Room 2004
 American Psychological Association
 750 First Street, NE
 Washington, DC 20002-4242

The first review of nominations will begin December 7, 1998.