

Social Ecological Predictors of Repeat Adolescent Pregnancy

CONTEXT: Women with multiple pregnancies in adolescence may experience medical, psychological and social complications. Improved understanding of the individual-, dyad-, family-, peer/community- and social system-level risk factors for repeat pregnancy may lead to the development of more effective prevention strategies for adolescent mothers in a variety of settings.

METHODS: Between 1993 and 1996, white, black and Mexican American adolescent mothers at a labor and delivery unit in Texas were interviewed after delivery and completed written surveys prospectively for up to 48 months. Logistic regression analyses were used to determine predictors of repeat pregnancy within 24 months, using social ecological theory as a guide.

RESULTS: Forty-two percent of adolescent mothers experienced a repeat pregnancy within 24 months; 73% of these delivered a second child. Individual-level predictors were planning to have another baby within five years (odds ratio, 1.6) and not using long-acting contraceptives within three months of delivery (2.4). Dyad-level predictors were not being in a relationship with the father of the first child three months after delivery (2.0), being more than three years younger than the first child's father (1.6) and experiencing intimate partner violence within three months after delivery (1.9). Peer/community-level predictors were not being in school three months postpartum (1.8) and having many friends who were adolescent parents (1.5).

CONCLUSION: Adolescent mothers are at high risk for a rapid subsequent pregnancy. Interventions that address the complex and multifaceted aspects of the lives of adolescent mothers are needed to prevent repeat pregnancy.

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Adolescent pregnancy is a serious public health problem in the United States. When compared with older mothers, adolescent mothers disproportionately suffer from limited education and low socioeconomic status.¹ They are more likely than older mothers to have low-birth-weight infants, and their children are at increased risk for developmental and behavioral difficulties. A rapid repeat pregnancy during adolescence, defined as one occurring within 24 months of the previous birth, compounds the challenges to the young woman and her family.² In 2003, of the 421,241 preadolescent and adolescent U.S. births, 84,570 were second or higher order births.³ A review of studies on repeat adolescent pregnancy conducted during the 1980s and 1990s showed that between 28% and 63% of adolescent mothers become pregnant again within 18 months, and 20–37% experience a repeat birth within 24 months.⁴ Compared with women aged 20–29, adolescents who experience a subsequent pregnancy are at greater risk for receiving inadequate prenatal care,⁵ having premature deliveries⁶ and having stillbirths. In addition, adolescents who experience a rapid subsequent pregnancy are less likely to be enrolled in or to complete high school than adolescent mothers who avoid a repeat pregnancy, and are therefore at higher risk for long-term poverty and welfare dependence.^{7,8}

Social ecological theory provides a useful framework for understanding the effects of multiple levels of influence (e.g., individual, dyad, family, peer/community and social system) on behavioral outcomes.^{9,10} According to the theory, development and behavior are influenced by a range of factors, from those that are closest to the individual, such as individual experiences and attitudes, to those that are distal features of the social environment, such as the ways in which race, ethnicity and socioeconomic status operate in a particular culture. By providing a comprehensive view, social ecological theory helps program planners and providers identify effective strategies for modifying risky behavior. Such strategies could include individual health education, couple counseling, family education, initiatives to strengthen educational and occupational opportunities, social marketing to foster healthier peer and societal norms, and policies and programs to address socioeconomic, racial and ethnic health disparities.

Yet, few studies of repeat adolescent pregnancy have had sufficient sample size^{11,12} and racial or ethnic diversity¹² to permit evaluation of social contextual characteristics commonly cited as predictors of repeat pregnancy, including race or ethnicity and low socioeconomic status. Other studies have employed national data sets that do

not contain important information specifically related to adolescent childbearing, including postpartum contraceptive use.¹³⁻¹⁵ Finally, several prior studies have examined repeat adolescent pregnancy and race or ethnicity within populations of adolescent mothers attending specialized clinics or interventions,¹⁶⁻¹⁸ results from such studies may not be generalizable to adolescents who do not attend these targeted clinics or programs.²

The goals of the project described in this article were to evaluate the incidence of repeat pregnancy within 24 months of delivery in a large, multiethnic sample of adolescent mothers who were followed prospectively for four years and to identify multilevel predictors of subsequent pregnancy.

BACKGROUND

Studies have examined predictors of repeat pregnancy within various populations of adolescent mothers. In studies of individual-level factors, repeat pregnancy has been associated with using drugs or alcohol,¹⁶ experiencing physical or sexual violence,¹⁹ having planned the first pregnancy,¹³ having positive attitudes toward adolescent childbearing¹⁶ and wanting to have a baby.²⁰ Although oral contraceptives are commonly prescribed to adolescent mothers, compared with use of depot medroxyprogesterone acetate (DMPA) or levonorgestrel implants, their use has been associated with increased risk of subsequent pregnancy; the difference may be attributable to inconsistent use or method discontinuation.^{21,22}

In studies examining dyad-level factors, being married prior to^{13,23} or after the index delivery¹³ and having an older partner²⁰ or one who wanted a child²⁴ have been associated with repeat adolescent pregnancy. Several family-level characteristics have been linked to multiple pregnancies during adolescence: having a poor mother-daughter relationship,²⁴ an unsupportive family,¹⁶ and a mother who did not have a high school education¹³ or who had been an adolescent parent herself.¹⁷

With respect to peer/community-level factors, repeat pregnancy has been found to be more common among adolescents whose best friends have ever been pregnant.¹¹ Other significant factors are having dropped out of school prior to the initial pregnancy,^{14,16,17} not enrolling in school after delivery^{13,14,20} and having low educational aspirations.^{15,25}

At the level of social system factors, multiple studies have looked at race and ethnicity in relation to repeat adolescent pregnancy and childbirth, but the results have been inconsistent. Some studies have found that black and Hispanic adolescent mothers are more likely than whites to have a repeat pregnancy,^{13,14} while others have found no relationship between race or ethnicity and repeat pregnancy.^{16,17} Other studies have reported a relationship between low socioeconomic status or economic deprivation and repeat pregnancy.^{14,17}

This study uses social ecological theory to examine individual, dyad, family, peer/community and social

system factors that predict repeat pregnancy within 24 months. We hypothesized that significant predictors would be identified among all five levels of influence. With a better understanding of factors existing at and within the first three months after delivery, service providers and policymakers can develop effective targeted interventions to help prevent repeat pregnancy among pregnant adolescents and young mothers.

METHODS

We performed a secondary analysis of data collected for a larger study on drug use among mothers aged 12-18 during the first 48 months following delivery. Participants for the larger study were recruited from the labor and delivery unit at the University of Texas Medical Branch (UTMB) at Galveston between December 8, 1993, and February 28, 1996. Eligibility criteria and recruitment procedures have been described previously²⁶ and are reviewed briefly here. Adolescent mothers were eligible to participate if they categorized themselves as black, Mexican American or white; planned to retain custody of their babies; could read and write at a fifth-grade level in either English or Spanish; had no major psychiatric disorders; and delivered an infant weighing at least 1500 g. Every adolescent who delivered during the recruitment period was evaluated for eligibility, and more than 99% of those who were eligible were asked to participate; fewer than 10% of eligible women refused to participate.

A total of 932 participants were recruited; there were nearly equal proportions of Mexican Americans and blacks. Participants were interviewed in English or Spanish within 24 hours of the index delivery and were mailed surveys to complete three, six, 12, 18, 24 and 48 months after discharge. Participants who were pregnant at the 24-month survey were sent additional surveys at 30 and 36 months. All interviews and surveys were written at the fifth-grade reading level.

The present analysis had additional inclusion criteria. All participants must have been primiparous at their index delivery. Participants also must have completed a three-month survey and at least one survey at 24, 30, 36 or 48 months after delivery, or had subsequent pregnancy confirmed through hospital delivery logs or medical chart review. Of the 779 primiparous participants, 662 (85%) returned their three-month survey. Three participants were excluded from further analyses because they reported being pregnant at three months; it was impossible to determine whether variables measured concurrently could predict pregnancy. Seventy-eight participants did not complete any surveys at or after 24 months and were excluded. The final sample comprised 581 participants. The analytic sample did not differ significantly from the initial sample with respect to age at delivery, race or ethnicity, whether the index pregnancy had been planned, age of father of index child, previous abortion or miscarriage, and age of the adolescent's mother at her first delivery.

Follow-up surveys were completed by mail; to increase the response rate, participants who did not return surveys were followed up by phone or when they attended one of the UTMB clinics during the appropriate survey interval. Participants received \$10 for completion of each survey through 24 months and \$25 for completion of the 48-month survey. Each survey was reviewed for inconsistencies and missing data; participants were contacted for clarification, as needed and possible. The survey return rate averaged 80% through 24 months and was 76% at 48 months. More than 90% of surveys sent at 30 or 36 months were completed. Additional details regarding the collection of follow-up data have been described elsewhere.²⁷

The Baylor College of Medicine Institutional Board for Human Subjects approved the analyses presented here.

Independent Variables

Although the construct of levels of influence is consistent within social ecological theory, the factors identified within each level may differ depending on the research question. Our classification scheme is similar to that used in a systematic review of risk factors for STDs and repeat pregnancy in adolescent mothers.⁴

- **Individual.** The three-month follow-up survey asked participants to report on self-esteem and depressive symptoms, substance use, sexual activity and contraceptive use. Self-esteem was evaluated using the Rosenberg Self-Esteem Scale,²⁸ a 10-item measure that has been used extensively in samples of adolescent mothers (possible range, 10–40; Cronbach alpha=0.87). Depressive symptoms were measured using the Beck Depression Inventory, Short Form. This 13-item instrument, with strong psychometric properties, is commonly used in primary care settings as a brief screen for depression in adolescents and adults (possible range, 0–39; Cronbach alpha=0.81 for current sample).²⁹ Participants whose total scores ranged from eight to 39 were coded as having moderate to severe depressive symptoms.

To determine substance use, participants were asked whether they had used tobacco, alcohol (beer, wine, wine coolers or hard liquor) and other drugs (marijuana or hashish, amphetamines, barbiturates, tranquilizers, cocaine, inhalants, LSD, heroin or rohypnol) during the three months since delivery and how many times they had used each in the preceding 30 days. The resulting variables were coded yes or no for use of each of tobacco, alcohol and other drugs. For the purpose of analysis, and because of low rates of use in the early postpartum period, use of alcohol, marijuana and other drugs was combined into a single dichotomous variable.

Information on pregnancies prior to the index delivery was obtained via medical record review and verified by participant report. Plans to have another baby were assessed by asking each adolescent the age at which she planned to have a second child; participants had the option of saying that they did not plan to have any additional babies.

Participants were asked what types of contraceptive methods they had used in the past three months, if any, including levonorgestrel implants, DMPA injections and birth control pills, as well as when and where they had received them. Long-acting contraceptives (DMPA, implants and IUDs) are different from other methods because they are not dependent upon daily administration, as are oral contraceptives, and are not coital-dependent, as are condoms. Thus, we compared adolescents who reported receipt of long-acting contraceptives with adolescents who used any other method, including birth control pills, condoms or no method.

- **Dyad.** The baseline interview and three-month follow-up survey inquired about the adolescent's living arrangement and romantic relationships, including whether she was still involved with the father of her index baby or dating someone new, the age of her baby's father or her current partner, and her current partner's desire to have a baby with her. Living arrangements were evaluated by asking each participant to record who was living in her household. Adolescents who reported that they lived with the father of the index child or their boyfriend or husband were categorized as living with their male partner. Being hit by her male partner in the three months since delivery was confirmed if the adolescent reported she had been hit, slapped, kicked or physically hurt enough to cause bleeding or had been hit during an argument or while her partner was drunk or high.³⁰ Sexual coercion was defined as having been forced to touch a current or former partner sexually or to have sexual intercourse without consent.

- **Family.** The participant's mother was considered a teenage mother if she had been 19 years or younger when her first child was born. Maternal closeness was measured through three items on a four-point scale from strongly agree to strongly disagree that assessed the adolescent's feeling that she could talk with her mother (includes female guardian), felt close to her and enjoyed spending time with her (Cronbach alpha=0.68). Maternal monitoring was measured through three items on a similar scale that assessed the adolescent's perception that her mother wanted to know whom she spent time with, gave clear reasons for the rules set for her behavior and strictly enforced those rules (Cronbach alpha=0.86). Because of the large amount of missing data regarding paternal relationships, paternal monitoring and closeness were not included as predictor variables. Participants were asked if they had a sister, if their sister had children and the age at which their sister had had her first child. Adolescents who had a sister who had been 19 or younger when she had her first child were categorized as having a sister who was a teenage parent.

As previously described,³¹ social support from family members (Cronbach alpha=0.84) and overall support from any source (Cronbach alpha=0.90) were evaluated with five items using five-point scales to indicate the amount of emotional, financial, informational, transportation

and child care support received. Adolescent mothers were asked to indicate the amount of criticism they received from family members, using nine items (such as “My family gives me too much advice on how to care for my child” and “My family tells me I am too young to be a mother”) on a four-point scale from strongly agree to strongly disagree (Cronbach alpha=0.78).³² Each participant was asked whether a family member had hit or hurt her or had hit, slapped, kicked or hurt her enough to cause bleeding during the three months since delivery. Chronic verbal abuse was defined as having been called ugly names at least six times in the prior three months by someone close (such as family, friend or boyfriend).

- **Peer/community.** Participants were asked at delivery if they were currently enrolled in school, had graduated or had gotten their GED; this information was used to determine whether the adolescent had dropped out of school prior to or during her pregnancy. The adolescents were asked how many grades they had repeated in school, if any. At three months postpartum, participants were asked if they were enrolled in school full-time, part-time or not at all, as well as whether they were currently working and how many hours per week, if any. Religiosity was evaluated by asking participants to indicate how frequently they attended religious services; responses ranged from never to weekly, and were dichotomized into monthly or more versus less frequently. Participants were asked how many of their friends had had babies before they were 19 years old; responses were dichotomized into half or more friends had had teenage births versus none or a few friends had. The adolescents were asked how many of their friends had dropped out of school; responses were dichotomized into half or more friends had dropped out versus none or a few. Perceived social stigma associated with being pregnant as an adolescent was measured using a single item (“I worried about what others thought of me while I was pregnant”); responses from a four-point scale were collapsed into agree or disagree.³² Community violence was assessed through a series of items that asked the number of times during the three months following delivery the adolescent had seen someone attacked with a weapon, carried a weapon to protect herself or been afraid of being hurt by other teenagers.

- **Social system.** Race or ethnicity was self-reported as white, Mexican or Mexican American, or black. Economic resources were considered limited if the adolescent mother reported ever going hungry because she did not have enough money for food.

Dependent Variable

The major dependent variable in this study was whether the participant experienced a repeat pregnancy within 24 months of the index delivery. Repeat pregnancy was determined through adolescents’ own reports of having experienced a subsequent pregnancy or birth on one or more surveys.

In each follow-up survey, participants were queried about the birth dates of all of their children, as well as their number of pregnancies since the hospital interview and the outcome of each. Participants were also asked the approximate date of their last menstrual period. Adolescents who were currently pregnant were asked how they had found out they were pregnant, whether they had been trying to conceive, if they had wanted to be pregnant, the date of their first visit to the doctor or clinic since they had gotten pregnant, their due date (as assessed by the doctor or clinic) and whether the child they were currently carrying was fathered by the same person who fathered the child of the index pregnancy. Those who reported that their pregnancy had been planned were asked to choose their reasons for trying to conceive from a structured list or to write in their own response. A similar set of questions was asked of participants reporting a delivery. Birth dates and birth location were determined, as was the approximate number of prenatal clinic visits.

In another part of each survey, participants were asked how many children they had delivered in total and the birth date for each. Although highly redundant across surveys, these questions provided excellent opportunities to both identify and clarify inconsistencies in responses. For example, a participant who said she might be pregnant at 12 months, but had not yet been to a doctor, would have provided additional pregnancy-related information in subsequent surveys.

Hard copies of all surveys completed by each participant were reviewed at one sitting, and data on repeat pregnancies were carefully examined. To verify reports of pregnancies occurring within 24 months of the index delivery, we monitored birth records at UTMB during the study period to identify deliveries by study participants; 104 out of 178 reported deliveries were verified in this way. Month of conception was approximated using birth records (gestational age at delivery and delivery date), survey data (date of entry into prenatal care, due date and delivery date across surveys) and a gestational wheel, a tool used to estimate pregnancy gestation and date of delivery. A second reviewer independently verified all information obtained through this process. Discrepancies were resolved through consensus.

Analysis

Data were entered, verified and analyzed using SPSS, version 14.0. Rates of repeat pregnancy and pregnancy outcomes through 24 months were assessed for the entire sample and stratified by race or ethnicity. Bivariate analyses (Student’s t test and chi-square) were used to identify variables potentially associated with the outcome. Those related at $p < .20$ were entered into logistic regression analyses. Multicollinearity among factors was evaluated using correlation (Pearson’s r or Spearman’s ρ) or chi-square analyses, depending on the level of measurement. Logistic regression analyses using backward elimination (likelihood ratio) were used to identify

the most important variables from the baseline and three-month surveys that predicted repeat pregnancy by 24 months. The final model consisted of only those factors significantly related to the outcome at $p < .05$.

RESULTS

Descriptive Findings

Adolescent mothers in this study averaged 16.7 years of age (standard deviation, 1.2), with a range of 12–18 years (Table 1). Eighteen percent of the young women stated that their initial pregnancy had been planned; 12% had experienced an abortion or miscarriage prior to the delivery of their first child. Nearly half were enrolled in school three months postdelivery (Table 2, page 44). Two-thirds of the mothers of the adolescents had delivered their first child as teenagers, although their average age at first birth had been about two years older than their daughters' (mean, 18.7 years; standard deviation, 3.4). The average age of the father of the first child born to the adolescents was 19.8 (standard deviation, 3.6), with a range of 13–48 years (not shown). Most of the adolescent mothers lived with a female adult (64%; not shown); 41% lived with their male partner. Fewer than 5% of adolescent mothers said they planned to have their next child within the next two years (not shown).

A total of 245 (42%) adolescent mothers experienced a repeat pregnancy within 24 months—47% of whites, 40% of blacks and 41% of Mexican Americans (not shown). Seventy-three percent of these repeat pregnancies resulted in a second birth (75% among whites, 69% among blacks and 74% among Mexican Americans); the rest resulted in miscarriage (14%) or abortion (13%). No racial or ethnic differences were associated with repeat pregnancy or pregnancy outcome. Of interest, 18% of repeat pregnancies were reported to have been planned. There were racial or ethnic differences in whether the repeat pregnancy had been planned: Twenty-five percent of white adolescents said their repeat pregnancy had been planned, compared with 18% of Mexican American and 9% of black adolescents ($p < .05$). Among the 44 adolescents who planned their subsequent pregnancy, the most commonly selected reasons were to have children close in age and to ensure that the older child had someone to play with. Of the responses participants wrote in, the most frequent reasons were that the adolescent just wanted another child, that she and her partner wanted another child, and that her partner wanted another child or she wanted to keep her partner.

Bivariate Findings

Results of bivariate analyses showed that adolescents who experienced a subsequent pregnancy were less likely to have been given a long-acting contraceptive within the first three months of delivery than adolescents who did not (Table 1). When compared with adolescents who did not experience a rapid repeat pregnancy, those experiencing a repeat pregnancy were significantly more likely to report

TABLE 1. Selected individual and dyad characteristics of 12–18-year-old women giving birth at a Texas medical center, by whether they had a repeat pregnancy within 24 months, 1993–1996

Characteristic	Total (N=581)	Repeat pregnancy (N=245)	No repeat pregnancy (N=336)
Individual			
Mean age at delivery	16.66	16.76†	16.59
Mean self-esteem‡	32.00	31.79	32.12
Moderate/severe depressive symptoms	34.9	35.2	34.6
Tobacco use	21.3	26.9**	17.3
Alcohol/marijuana/other drug use	35.8	37.1	34.8
Abortion/miscarriage prior to delivery§	11.9	14.7†	9.8
Planned first pregnancy§	17.6	21.2*	14.9
Given long-acting contraceptive	36.0	25.5***	43.7
Plans to have baby in ≤5 years	30.1	34.7*	26.7
Did not want to become pregnant again	36.7	34.3	38.5
Dyad			
Father of first child >3 years older§	34.4	39.3*	30.8
Married/in a relationship with father of first child	65.8	61.3†	69.0
New partner	16.4	18.8†	14.6
Lives with male partner	40.8	43.7	38.7
Partner did not want her to become pregnant again	37.3	36.8	37.6
Hit by boyfriend/husband	19.6	25.1**	15.6
Sexually coerced since delivery	2.8	3.7	2.1

* $p < .05$. ** $p < .01$. *** $p < .001$. † $p < .2$. ‡Range, 10–40; higher score indicates greater self-esteem. §Baseline measure. Note: Unless otherwise noted, data are percentages and were measured three months postpartum.

smoking cigarettes at three months, to have planned their first pregnancy and to be planning to give birth within five years.

The dyad factors associated with repeat pregnancy were that adolescent mothers who experienced a repeat pregnancy were more likely than those who did not to report that the father of their first child was more than three years older than they were and that they had been hit by their boyfriend or husband in the three months since delivery.

Two family factors were significantly associated with repeat pregnancy (Table 2). Adolescents experiencing a repeat pregnancy were less close to their mothers and reported lower family support than young mothers who did not experience a repeat pregnancy.

One community factor was significantly associated with repeat pregnancy—adolescents who experienced a subsequent pregnancy were less likely to be enrolled in school at three months than adolescent mothers who did not.

One social system factor was significantly associated with repeat pregnancy. Young mothers who experienced a repeat pregnancy were more likely to have limited economic resources than were those who did not experience a repeat pregnancy.

Multivariate Findings

Seven variables—two at the individual, three at the dyad and two at the peer/community level—predicted repeat pregnancy in the final model (Table 3, page 44). Adolescent mothers who planned to have a second baby within five years and those who had not started a long-acting contraceptive by three months postpartum were at increased risk of repeat pregnancy (odds ratios, 1.6 and 2.4, respectively). Adolescent mothers who were no

TABLE 2. Selected family, peer/community and social system characteristics of adolescent mothers, by whether they had a repeat pregnancy within 24 months

Characteristic	Total	Repeat pregnancy	No repeat pregnancy
Family			
Mother's mean age at first birth	18.72	18.74	18.71
Mother has high school education	53.6	52.3	54.5
Mean closeness to mother‡,§	1.59	1.64*	1.55
Monitoring by mother‡,††	2.09	2.11	2.08
Sister is a teenage mother‡	13.6	13.4	13.7
Mean family support‡‡	1.75	1.83*	1.68
Mean overall support§§	4.01	4.05	3.96
Mean family criticism†††	2.82	2.84	2.81
Hit by family member	11.7	11.8	11.6
Chronic verbal abuse	15.4	18.4†	13.1
Peer/community			
Dropped out of school prior to first pregnancy	18.5	19.2	17.9
Repeated at least one grade‡	44.2	48.1†	41.4
Enrolled in school	47.5	39.1**	53.6
Employed full- or part-time	17.4	18.9	16.4
Higher religiosity‡	48.2	43.7†	51.5
≥half of friends were teenage mothers‡	29.7	34.0†	26.5
≥half of friends dropped out of high school‡	15.7	18.2†	13.9
Social stigma regarding teenage parenting‡	42.0	41.2	42.6
Community violence‡	35.4	36.9	34.3
Social system			
White	29.8	33.1	27.4
Black	33.2	31.4	34.5
Mexican American	37.0	35.5	38.1
Completed interview/survey in Spanish	9.5	9.4	9.5
Limited economic resources	24.3	29.0*	20.8

*p<.05. **p<.01. †p<.2. ‡Baseline measure. §Scale, 1–4; lower score indicates greater closeness. ††Scale, 1–4; lower score indicates greater monitoring. ‡‡Scale, 1–5; lower score indicates greater support. §§Scale, 1–5; lower score indicates less support. †††Scale, 1–4; lower score indicates more criticism. Note: Unless otherwise noted, data are percentages and were measured three months postpartum.

longer in a relationship with their index baby's father, those whose index baby's father was more than three years their senior and those who had been hit by their boyfriend or husband were at elevated risk of subsequent pregnancy (odds ratios, 2.0, 1.6 and 1.9, respectively). Finally, adolescent mothers who were not enrolled in

TABLE 3. Odds ratios (and 95% confidence intervals) from logistic regression analysis of associations between selected characteristics and the risk of repeat pregnancy within 24 months

Characteristic	Odds ratio
Individual	
Plans to have baby in ≤5 years	1.55 (1.03–2.34)*
Not given long-acting contraceptive within 3 months after delivery	2.38 (1.61–3.52)***
Dyad	
Not in a relationship with father of first child 3 months after delivery	2.04 (1.37–3.05)***
Father of first child >3 years older	1.60 (1.10–2.35)*
Hit by boyfriend/husband within 3 months after delivery	1.85 (1.18–2.88)**
Peer/community	
Not enrolled in school 3 months after delivery	1.75 (1.20–2.55)**
≥half of friends were teenage mothers at delivery	1.52 (1.03–2.26)*

*p<.05. **p<.01. ***p<.001.

school three months postpartum and those who reported at delivery that half or more of their friends were also teenage parents had a significantly raised risk of experiencing a pregnancy within 24 months (odds ratios, 1.8 and 1.5, respectively).

DISCUSSION

In this sample, 42% of adolescents became pregnant within 24 months of their first live birth. This result is consistent with rates reported in prior studies.⁴ As hypothesized, and consistent with social ecological theory, multiple levels of influence (individual, dyad and peer/community factors) predicted which adolescents experienced a repeat pregnancy. Multifaceted interventions that target adolescent mothers and the communities in which they live at delivery and during the early postpartum period can help these young families to overcome negative outcomes such as repeat pregnancy.

Failure to initiate a long-acting contraceptive method within three months of delivery was the strongest predictor of rapid repeat pregnancy; this finding confirms results of other studies.^{12,16,18,21,25} Adolescents can be poor users of oral contraceptives, forgetting to take them consistently or discontinuing them without seeking another method, thereby increasing the risk of unplanned pregnancy.^{21,22} Condoms are highly effective at preventing pregnancy and STDs when used consistently and correctly, but are commonly used incorrectly.³³ Our study indicates that early adoption of easy-to-use, long-acting contraception is highly effective in preventing repeat pregnancy, even though adolescents may later discontinue the method. Many adolescent mothers become sexually active within 2–3 months of delivery.³⁴ Providers can help adolescents delay repeated childbearing by advising those who do not wish to become pregnant soon (most adolescents) to use long-acting contraceptives and by providing access to these methods before hospital discharge following delivery, at postpartum checkups and at appointments for additional services. Providers should consider same-day (rapid-start) contraceptive administration, which does not require starting the method during the first 5–7 days of the menstrual cycle.³⁵

A second predictor of repeat pregnancy at 24 months was the experience of intimate partner violence within three months after delivery. This finding also supports results of a previous study.¹⁹ Adolescent mothers who are in violent relationships may find it difficult to refuse sexual activity or to negotiate contraceptive use with an agitated partner. Sexually active adolescent females who experience verbal abuse are less likely to use condoms than those who do not, and those who experience intimate partner physical abuse are more likely to become pregnant than those who do not.³⁰ Thus, screening for abuse in the early postpartum period could lead to both interventions to prevent intimate partner violence and promotion of long-acting contraceptives.

DMPA often may be used without a partner's knowledge and thus may help delay a subsequent pregnancy for adolescents who have difficulty negotiating condom use or are not ready or able to discontinue their violent relationships.

Childbearing intentions also predicted which adolescents had a repeat pregnancy within 24 months. Very few adolescent mothers planned to become pregnant again within two years. However, those who said they planned to have their next child in the next five years were more likely to experience pregnancy within 24 months of the index delivery. Other studies have also found that adolescent mothers' intentions and positive attitudes toward childbearing can influence the likelihood of subsequent pregnancy.^{16,20} Some teenage mothers may be ambivalent about using contraceptives to prevent additional pregnancies.³⁶ Others may feel they have limited educational and occupational options, and that early motherhood is not a tragic or even problematic choice.³⁷ Thus, lacking a firm resolve to avoid becoming pregnant may be as much a marker for pregnancy risk as is overt intention to become pregnant.^{38,39}

Participants who were enrolled in school three months postpartum were less likely to experience a repeat pregnancy than those not enrolled. This is consistent with the findings of previous studies.^{16,17,33} Interventions can help adolescent mothers stay in school. For example, earlier work has shown that young women who received school-based prenatal care had reduced dropout rates during pregnancy,⁴⁰ and that participants in a public health nursing early intervention program had reduced dropout rates postpartum.⁴¹ Adolescent parents who lack strong school connections or commitment to completing educational goals may require targeted interventions to prevent repeat pregnancy.

Adolescents who said that at least half of their friends were adolescent parents had an elevated risk of repeat pregnancy. Perceptions of normative peer behavior are an important influence on adolescent behavior and have been associated with both adolescent sexual activity and pregnancy.⁴² Neighborhood and peer contexts in which early childbearing is prevalent may create a normative climate for more than one pregnancy in adolescence. Thus, inquiring about what the young mother sees as common in her community and her peer group with respect to childbearing may provide important information about who is most at risk for repeat pregnancy.

Participants who were no longer in a relationship with the father of their first child at three months were more likely to have a repeat pregnancy than were those still involved with their baby's father. In contrast, other studies have reported that adolescents in long-term relationships, including marriage, are more likely to have subsequent pregnancies.^{13,23} However, within a few months of delivery, some adolescent mothers are no longer involved with their child's father.⁴³ Those who have disengaged from a relationship may underestimate

the need for family planning services and may be unprepared to prevent pregnancy in a new relationship. Some adolescent mothers in new relationships may be willing to become pregnant with the child of a new potential long-term partner to create a new, shared family. Providers working with adolescent mothers may encourage them to utilize long-acting contraceptives until they are certain of their childbearing intentions.

Adolescents in relationships with men more than three years their senior were more likely to experience a subsequent pregnancy than were adolescents with partners of similar age. Female adolescents in relationships with older partners tend to be younger, less likely to use a condom at first intercourse, less likely to use condoms consistently and more likely to become pregnant than adolescents with partners of similar age.⁴⁴ An older partner may take advantage of the adolescent's relative inexperience, insecurity or financial dependence by resisting her desire to use measures to delay childbearing or reduce the risk of STDs. Because of concerns about exploitation of adolescents by much older partners, many states have instituted mandatory reporting policies that may result in providers' avoiding questions about partner characteristics such as age.⁴⁵ Nevertheless, medical and social service providers should help young mothers to think about how potential age, financial or relationship imbalances may affect decisions regarding childbearing and other life plans.

Limitations

This study had several limitations. All survey responses were self-reported and subject to the individual state of mind of the adolescent at the time she answered the survey. Because our aim was to look prospectively at risk and protective factors for repeat adolescent pregnancy, all predictor variables had to be measured before the adolescent knew of a second pregnancy. To strengthen our ability to draw causal inferences, potential predictor variables were restricted to those examined at baseline and three months later. One potential weakness of this approach is that the lives of adolescent mothers change quickly,⁴⁶ and their experiences a year later may have a greater impact on whether they have a repeat pregnancy than their circumstances at three months postpartum. Yet, interventions designed to prevent repeat pregnancy must begin in the early postpartum period; studies such as this one are therefore important resources for the development of effective interventions.

An additional limitation is that many of the data for this cohort are more than 10 years old. Results from this study may not apply to later cohorts, particularly those whose first birth occurred after welfare reform, but the predictors identified are similar to those found in studies of adolescents giving birth in the 1980s and 1990s. Moreover, it is unlikely that a study with this degree of complexity (e.g., longitudinal, comprehensive, multiethnic) will be repeated in the near future, particularly outside of the context of an

Failure to initiate a long-acting contraceptive method within three months of delivery was the strongest predictor of rapid repeat pregnancy.

intervention. Finally, results from this study may not be generalizable to adolescent mothers of other racial or ethnic groups or those who live in different regions of the country.

Conclusions

Despite these limitations, this study supports the use of social ecological theory as a framework for understanding the factors that influence adolescent childbearing. The prospective longitudinal nature of the study and the large sample of black, Mexican American and white adolescent mothers allowed appropriate use of statistical methods requiring large samples, in addition to permitting inferences regarding causality.

Programs directors and policymakers can use our findings to create interventions to reduce repeat pregnancies in adolescence and to ameliorate some of the potential difficulties experienced by adolescent parents and their families. Such interventions might include policies, programs and funding to intensify and lengthen services to young mothers and their children in the postpartum period, to strengthen connections to educational and occupational opportunities, to improve adolescents' and their families' understanding of the effects of partner selection and characteristics on their life course, and to provide individual and partner health education or counseling on family planning and healthy relationships. If the complex and interrelated dynamics of adolescents' lives are taken into account, correspondingly varied strategies may be developed to help young mothers reduce the risk of subsequent pregnancies, pursue educational and occupational goals, and mature personally and in their roles as parents.

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