Teen Birth Rates in Sexually Abused and Neglected Females

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KEY WORDS
adolescent sexual behavior, maltreatment, prospective study, teen childbirth

ABBREVIATIONS
CI—confidence interval
CPS—Child Protective Services
OR—odds ratio
SAAQ—Sexual Activities and Attitudes Questionnaire

Dr Noll conceptualized and designed the study, drafted the initial manuscript, formulated and executed the analytic plan, and approved the final manuscript as submitted; and Dr Shenk contributed substantially to the analytic plan, contributed text to several sections of the manuscript, reviewed the manuscript, and approved the final manuscript as submitted.

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WHAT'S KNOWN ON THIS SUBJECT: Despite downward trends, the US teen birth rate remains among the highest of developed nations. Childhood maltreatment may place teens at higher risk, but inferences are weak given a lack of prospective study and control for alternative explanations.

WHAT THIS STUDY ADDS: Results from the first controlled, prospective study of nulliparous teenagers confirm that victims of maltreatment are more than twice as likely as their nonmaltreated peers to experience a teen childbirth after controlling for demographic confounds and other known risk factors.

abstract

OBJECTIVE: Prospectively track teen childbirths in maltreated and nonmaltreated females and test the hypothesis that child maltreatment is an independent predictor of subsequent teen childbirth over and above demographic characteristics and other risk factors.

METHODS: Nulliparous adolescent females ($N = 435$) aged 14 to 17 years were assessed annually through age 19 years. Maltreated females were referred by Child Protective Services agencies for having experienced substantiated sexual abuse, physical abuse, or neglect within the preceding 12 months. Comparison females were matched on race, family income, age and family constellation. Teen childbirth was assessed via self-report during annual interviews. Births were confirmed using hospital delivery records.

RESULTS: Seventy participants gave birth during the study, 54 in the maltreated group and 16 in the comparison group. Maltreated females were twice as likely to experience teen childbirth after controlling for demographic confounds and known risk factors (odds ratio = 2.17, $P = 0.01$). Birth rates were highest for sexually abused and neglected females. Sexual abuse and neglect were both independent predictors of teen childbirth after controlling for demographic confounds, other risk factors and alternative forms of maltreatment occurring earlier in development.

CONCLUSIONS: Results provide evidence that sexual abuse and neglect are unique predictors of subsequent teen childbirth. Partnerships between protective service providers and teen childbirth prevention strategists hold the best promise for further reducing the US teen birth rate. Additional research illuminating the pathways to teen childbirth for differing forms of maltreatment is needed so that tailored interventions can be realized. *Pediatrics* 2013;131:e1181–e1187

The birth rate for US women aged 15 to 19 years was 34.3 per 1000 in 2010, the lowest rate ever recorded in the United States, with reductions observed in all racial and ethnic groups.[1] This estimate continues a declining trend since a peak in birth rates for this age group in 1991.[2] The decline in birth rates is attributed to public policy and prevention efforts targeting identified risk factors for teen pregnancy and motherhood, specifically the degree of sexual activity[3,4] and the use of contraceptives.[5,6] However, the United States continues to have the highest teen birth rate (per 1000) among industrialized nations, including Canada (14.2), Great Britain (25.0), France (10.2), Italy (6.8), and Germany (9.8).[7] While progress is clearly being made, the US teen birth rate remains a serious public health concern, resulting in an annual burden of nearly $11 billion,[8] with significant long-term health and economic consequences for both the adolescent mother and her offspring.[9]

One explanation for the persistently high US birth rate is that there are risk factors for teen pregnancy and childbirth that are not addressed in current prevention efforts. Childhood maltreatment, an act of commission or omission by a parent or caregiver resulting in harm, potential for harm, or the threat of harm toward a child before the age of 18 years,[10] is substantiated in ~700 000 US children each year[11] and has been cited as a condition that significantly increases the risk for teen pregnancy and birth rates.[12] A meta-analysis of 21 studies found an aggregate effect size risk of 2.21 for teen pregnancy in maltreated samples, specifically for those experiencing sexual abuse.[13] However, this risk posed by maltreatment is not constant across studies,[14] and there are several methodologic limitations in the existing literature that weaken generalized causal inferences.[15] First, because control of potential confounds is rarely used, much of the extant research does not distinguish childhood maltreatment from other adversities or socioeconomic disadvantage,[16] nor does it account for known risk factors such as increased sexual activity and poor contraceptive use that could account for increased teen birth rates in maltreated samples.[17] Second, the use of cross-sectional designs with retrospective, self-report assessments of both maltreatment and pregnancies or births introduces the potential for bias. Third, most research has failed to distinguish teen pregnancy from teen childbirth, making it difficult to estimate the risk for childbirth per se. Finally, multiple forms of maltreatment, such as sexual abuse, physical abuse, and neglect, often co-occur,[18] and it is unclear whether different types of child maltreatment confer distinct risks for teen birth rates. Addressing these methodologic limitations has the potential to illuminate childhood maltreatment as a potent and unique risk factor for teen childbirth so that prevention efforts could be likewise focused and the teen birth rate could be further reduced.

The current study examined whether maltreatment increased the risk for teen childbirth in a well-controlled, prospective study of nulliparous females tracked throughout adolescence. Female adolescents experiencing substantiated maltreatment within the previous 12 months were recruited for participation by using a prospective cohort design with demographically matched, nonmaltreated controls. Annual follow-up assessments were conducted through age 19 years, and medical chart review was used to confirm teen birth rates. The following hypotheses were tested: hypothesis 1, maltreatment will increase the risk of subsequent teen birth rates after adjusting for socioeconomic factors as well as previously identified risks, including use of contraceptives and sexual activity level; and hypothesis 2, sexual abuse will exert a stronger effect on teen birth rates than will other types of maltreatment that may have occurred either at study entry or previously in development.

METHODS

Data Sources

This prospective, longitudinal cohort study was conducted from 2007 to 2012 and examined the impact of maltreatment on female sexual development in 514 adolescent females. The sample was drawn from the catchment area of a large urban children's hospital located in the Midwest region of the United States. Although this hospital mainly serves inner-city youth, the catchment area is sizeable and encompasses large rural counties. Inclusion/exclusion criteria were: (1) age 14 to 17 years at study entry; (2) nulliparous; (3) substantiated childhood maltreatment occurring within the previous 12 months; (4) the ability to read and understand English; (5) residence within the same home environment for a minimum of 12 months; and (6) a legal guardian or caregiver who was not the perpetrator of maltreatment and who could provide written informed consent. The study focused on maltreatment occurring within the past 12 months because we sought to reduce heterogeneity with respect to the timing of baseline assessments, and we were chiefly interested in how maltreatment during the adolescent period affects other adolescent processes. Maltreated females (n = 275) were recruited from local Child Protective Services (CPS) agencies. The maltreatment subtype distribution was physical abuse (37%), sexual abuse (43%), and physical neglect (20%). Comparison females (n = 239) were recruited, with the use of posted

flyers, from an outpatient health center located within the pediatric hospital. Comparison females were excluded from the study if, during an initial telephone screening interview, they reported any previous CPS involvement. Eligible comparison females were then demographically matched to at least 1 maltreated female on race, family income (within $10 000), age, and family constellation (1- or 2-parent households).

All methods and procedures were approved by the local institutional review board. A Federal Certificate of Confidentiality was also secured. Caregivers accompanied adolescents to provide written informed consent, and assent was obtained from adolescents. Families received approximately $20 per hour as monetary compensation for their time, travel, and participation. Consent to access CPS records for the entire sample was obtained to confirm substantiated maltreatment in both groups. Study staff examined CPS records and determined that substantiation was not fully confirmed for 2 participants enrolled in the maltreatment group. Thirty-one of those enrolled as comparison subjects had at least 1 previous incident of CPS-substantiated maltreatment. During the course of the 5-year study, an additional 35 comparison females reported maltreatment that was subsequently referred to CPS or confirmed through CPS records. These 68 females were excluded from current analyses to maintain the integrity of the maltreated and comparison groups, resulting in an available sample size of 446 (maltreated, 273; comparison, 173). Participants completed annual study assessments for up to 4 years or until they reached age 19 years. The retention rate over the longitudinal follow-up was 97.5%, resulting in a sample size of 435 (maltreated, 266; comparison, 169) subjects available for statistical analyses. At the initial assessment, this final sample had a mean ± SD age of 15.26 ± 1.07 years; a median household income of $30 000 to $39 000; a racial demographic of 43% white, 48% African American, 8% biracial or multiracial, 0.5% Hispanic, and 0.5% Native American; and 57% were in single-parent households. The resultant maltreated and comparison groups did not differ with respect to age, income, minority status, or family constellation.

Variables and Variable Definitions

Predictors: Maltreatment

The maltreated group was referred by CPS agencies for having experienced substantiated sexual abuse, physical abuse, or neglect within the previous 12 months. Physical abuse was defined as physical affronts by an adult caregiver resulting in markings or requiring the care of a physician. Sexual abuse was defined as genital contact or penetration/attempted penetration by a caregiver or a perpetrator at least 4 years older than the victim. Neglect was defined as abandonment, lack of supervision, or failure to provide the basic needs of nutrition, clothing, hygiene, and safety. In many cases, adolescents had >1 type of maltreatment; however, cases were categorized based on the "primary designation" as defined by the caseworker and which resulted in substantiation. For use in testing hypothesis 1, a dummy-coded variable was created to signify maltreatment status (1 = "maltreatment group," 0 = "comparison group"). Once enrolled, consent was secured from the entire sample to obtain lifetime maltreatment records from CPS agencies within the multiple jurisdictions where the sample population resided. These CPS records were examined by trained study staff to: (1) confirm the fidelity of the maltreatment and comparison groups; and (2) quantify instances of childhood maltreatment over participants' lifetime. For use in testing hypothesis 2, three dummy-coded variables representing the presence of each maltreatment subtype (sexual abuse, physical abuse, or neglect) were created: 1 set for maltreatment subtype at study entry, and 1 set for lifetime occurrences of each maltreatment subtype.

Outcome: Teen Childbirths

Teen childbirths were determined via self-report at each annual assessment through age 19 years by using a single-item indicator. Consent was obtained to acquire hospital labor and delivery records from those who indicated giving birth. A chart review of these birth records confirmed delivery. A dummy-coded indicator variable (0 = "no teen childbirth," 1 = "teen childbirth") was created for use in statistical analyses.

Covariates: Known Risk Factors of Teen Birth Rates in the General Population

Demographic characteristics, including family income and adolescents' racial background, were assessed via caregiver report at the initial study visit. Adolescents provided pregnancy history, the degree of sexual activity, and knowledge and use of contraceptives at each study visit via the Sexual Attitudes and Activities Questionnaire (SAAQ).[17] The SAAQ is a validated instrument commonly used with adolescents administered via multimedia computer to maximize anonymity and minimize the potential for embarrassment. SAAQ instructions explicitly state that participants are to consider sexual activity that was voluntary, not a time when sex may have been forced or was nonconsensual. Sexual activity was measured by using a single item indicating the number of sexual intercourse partners participants had over their lifetime. Answers ranged from 0 = "none," 1= "1," 2 = "2 or 3," 3 = "4 to 7," 4 = "8 to 10,"

and 5 = "more than 10." The mean ± SD for the overall sample was 1.30 ± 1.36; the maltreated group mean value was 1.53 ± 1.40, and the comparison group mean value was 0.92 ± 1.22 ($F_{1,434}$ = 22.28, $P < .0001$). Contraceptive use was measured by using a single item indicating the number of partners with which participants had sexual intercourse without contraception during their lifetime (using the same response pattern defined earlier). The overall sample mean was 0.68 ± 1.03; the maltreated mean was 0.83 ± 1.14, and the comparison mean was 0.45 ± 0.77 ($F_{1,434}$ = 14.67, $P < .0001$).

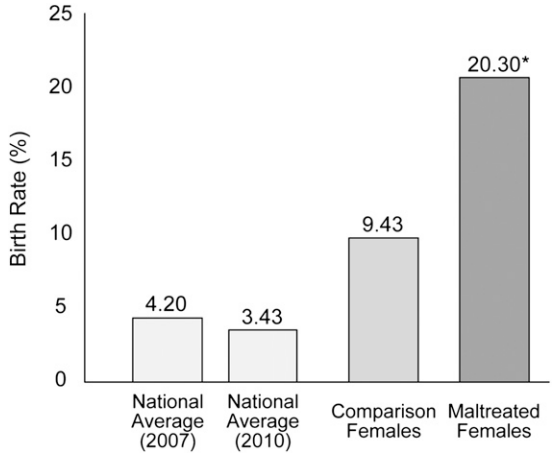

FIGURE 1
Birth rates for maltreated and comparison females in relation to the US national averages for 2007 and 2010. *Significantly different from the comparison group (OR = 2.17 [95% CI, 1.71–4.01]; $P = .01$); age at study entry, family income level, minority status, level of sexual activity, and contraceptive use covaried.

Data Analysis

Logistic regression via PROC LOGISTIC in SAS version 9.3 (SAS Institute, Inc, Cary, NC) was used as the main analytic tool for obtaining odds ratios (ORs) reflecting the degree of risk for teen childbirth associated with maltreatment, both with maltreatment status at study entry (hypothesis 1) and with the differing subtypes of maltreatment (hypothesis 2). Participant age at study entry, family income level (to the nearest $10 000), participant minority status (1 = "minority," 0 = "white"), degree of sexual activity, and contraceptive use were used as covariates in each regression model to control for demographic characteristics and other known risk factors for teen births.

RESULTS

A total of 70 participants gave birth during the course of the study (16 in the comparison group and 54 in the maltreated group). Figure 1 depicts teen birth rates in this sample compared with the most recent national birth rate statistics reported during the 2010 national survey (3.43%) and compared with the 2007 national survey, which is most proximal to when the study cohort was recruited (4.20%). In testing hypothesis 1, maltreatment status was associated with an adjusted OR of 2.17 (95% confidence interval [CI], 1.71–4.01; $P = .01$) suggesting that, over and above demographic risk factors and high sexual activity and low contraceptive use, adolescent females who experienced maltreatment were more than twice as likely to experience subsequent teen childbirth compared with their nonmaltreated peers.

Figure 2 shows the percentage of teen childbirths relative to the number of participants included within each subgroup. The percent within the sexually abused group was more than twice that of the comparison group, whereas the percent within the neglect group was ~3 times that of the comparison group. In testing hypothesis 2, a logistic regression model was used to assess whether specific subtypes of maltreatment predicted teen birth rates. Unadjusted (without covariates) and adjusted (with covariates) ORs are presented in Table 1. Sexual abuse and neglect at study entry significantly increased the odds of a subsequent teen childbirth by 2.74-fold and 3.14-fold, respectively, after controlling for

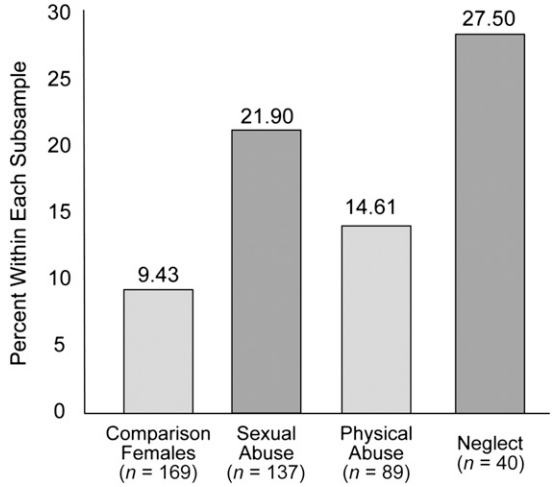

FIGURE 2
Birth rates according to type of maltreatment.

TABLE 1 Logistic Regression Results of the Odds That Differing Forms of Maltreatment Confer on Teen Childbirths

Maltreatment Subtype	OR (95% CI)	Adjusted OR (95% CI)[a]
Maltreatment subtype (at study entry)		
Sexual abuse	2.71 (1.34–5.48)[b]	2.74 (1.31–5.73)[b]
Physical abuse	1.71 (0.75–3.86)	1.50 (0.65–3.46)
Neglect	3.40 (1.31–8.80)[b]	3.14 (1.19–8.33)[b]
Maltreatment subtype (before study entry)		
Sexual abuse	0.65 (0.25–1.72)	0.59 (0.22–1.61)
Physical abuse	0.69 (0.31–1.52)	0.70 (0.31–1.57)
Neglect	1.49 (0.77–2.88)	1.21 (0.61–2.39)

[a] Adjusted for age, family income, minority status, number of lifetime sexual partners, and contraceptive use.
[b] $P < .05$.

previously identified risk factors and any previous occurrences of maltreatment. Physical abuse was not a significant predictor of subsequent teen childbirth nor was any subtype of maltreatment before study entry.

DISCUSSION

Child maltreatment is associated with a number of childhood and adult health outcomes that span developmental,[19] physical health,[20,21] and psychiatric[22] domains. The current set of results indicates that maltreatment, specifically sexual abuse and neglect during adolescence, significantly increased the risk of teen childbirth by 2.74-fold and 3.14-fold, respectively. This risk was maintained after adjusting for identified risk factors common in the general adolescent population such as family income, minority status, number of sexual partners, and contraceptive use. The current study also demonstrated that maltreatment, namely sexual abuse or neglect, occurring during the adolescent period was a potent predictor of subsequent teen childbirth relative to maltreatment occurring earlier in development. These results are derived from a study that is unique in terms of its methodologic rigor, including: (1) a prospective cohort design; (2) a demographically matched comparison group; (3) use of CPS substantiation of maltreatment to enhance the fidelity of group membership; and (4) use of medical records to confirm childbirths. This rigor can serve to strengthen inferences about the increased likelihood of subsequent childbirth for maltreated adolescents.

Although it was hypothesized that sexual abuse would confer the bulk of risk for subsequent teen childbirths, both sexual abuse and neglect were significant predictors. These 2 conditions are similar in terms of a CPS designation of significant harm imposed by a caregiver; however, the mechanisms of action for each are likely highly variable. For instance, previous prospective research has demonstrated that childhood sexual abuse victims reported younger ages at first intercourse and lower levels of birth control efficacy, thus setting the stage for risky sexual activity, teen pregnancy, and childbirth.[17] This research also showed that sexual abuse was associated with a propensity to be preoccupied with sexual thoughts and feelings, indicating that some victims may focus more explicitly on sexual rather than emotional rewards in early romantic relationships. This sexual preoccupation, when coupled with seemingly contradictory feelings of shame and betrayal that are often associated with being a victim of sexual abuse, can create confusion around sex and sexual arousal.[23] Moreover, secrecy about (and avoidance of) sexual thoughts and feelings may also interfere with effective communication regarding sex and intimacy. Such impairments and confusion can be especially disruptive during adolescence, a critical period when sexual debut often occurs and when critical sexual scripts are being developed.[24] Thus, adolescent victims of sexual abuse may have distinct approaches to sex and sexual activity that can be directly attributable to traumatic sexualization.[12]

Neglect, conversely, is an act of omission, in which parents and caregivers fail to provide the needed care and opportunities for promoting safe and normal development. In this sense, adolescents who have been neglected may lack the education, attention, and parental supervision that can reduce the likelihood of engaging in risky sexual activity, teen pregnancy, and early childbirth. It should be noted that the sample of neglected adolescents was small relative to the other subgroups (n = 40). Moreover, substantiation standards within the catchment jurisdiction are relatively stringent. For example, the majority of neglect cases were either directly resulting from a custodial parent being arrested or incarcerated for substance abuse or on discovery that the adolescent had gone several months without electricity, heat, or consistent sources of nourishment. Hence, it is unclear whether rates as high as 27% might hold in a larger, less severely neglected sample. Nevertheless, differing pathways to teen childbirth will be important to articulate because each will signal distinct intervention strategies.

Despite its methodologic strengths, the current study has several limitations. First, Hispanic adolescents, typically the ethnic group with the highest rates of teen childbirth,[1] were not well represented, and it is therefore inappropriate to generalize findings to this particular ethnic group. Second, only substantiated cases of maltreatment were considered. Thus, findings may be

conservative given that there are likely adolescents included in the sample who experienced maltreatment that was unreported or unsubstantiated. Third, teen childbirth rates in the comparison group were somewhat higher than the national average. The comparison group was recruited as a matched comparison sample with the goal of equating the groups on demographic risk factors to model the unique risk posed by maltreatment while ruling out potential demographic confounds. As such, the comparison is a relatively low-income, high ethnic-minority group and may not necessarily be comparable to the general US population on which national birth rate statistics are derived or to other regions of the country. Finally, analyses do not speak to pregnancy outcome alternatives that could have long-term implications for reproductive health (ie, abortion, miscarriage). Further research should be devoted to how reproductive decision processes might vary for maltreated versus nonmaltreated females as well as identifying exacerbating and protective factors that help explain why some maltreated females become pregnant and others do not.

Substantiated child maltreatment affects >350 000 females aged <18 years each year in the United States.[11] Thus, maltreatment affects a considerable number of adolescent females annually, and developing effective strategies to reduce the risk of teen childbirth within this population will likely affect the overall teen birth rate in the United States. As with the general adolescent population, primary prevention programs targeting sexual activity and contraceptive use will help mitigate the risk of childbirth for maltreated adolescents. These prevention efforts are responsible for the overall decline in US teen birth rates[5] and are cost-effective practices returning $4 in public health savings for every $1 spent.[25] However, secondary prevention will be especially important after exposure to maltreatment, particularly when tailored toward victims of sexual abuse and neglect, if the maximum benefits of primary prevention are to be realized. Because maltreatment victims are processed through local CPS agencies, caseworkers have a golden opportunity to educate these females as to the relative risk for, and consequences of, teen childbirth. Pediatricians can also provide such information to victims and their families when a maltreatment history is known or suspected. Similar efforts, when applied within the context of trauma treatments and other secondary prevention efforts for victims of maltreatment, will maximize this return on investment and likewise further reduce the overall teen birth rate in the United States.

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