

Adverse Childhood Experiences and Risk of Paternity in Teen Pregnancy

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OBJECTIVE: Few studies have investigated risk factors that predispose males to be involved in teen pregnancies. To provide new information on such factors, we examined the relationships of eight common adverse childhood experiences to a male's risk of impregnating a teenager.

METHODS: We conducted a retrospective cohort study using questionnaire responses from 7399 men who visited a primary care clinic of a large health maintenance organization in California. Data included age of the youngest female ever impregnated; the man's own age at the time; his history of childhood emotional, physical, or sexual abuse; having a battered mother; parental separation or divorce; and having household members who were substance abusers, mentally ill, or criminals. Odds ratios (ORs) for the risk of involvement in a teen pregnancy were adjusted for age, race, and education.

RESULTS: At least one adverse childhood experience was reported by 63% of participants, and 34% had at least two adverse childhood experiences; 19% of men had been involved in a teen pregnancy. Each adverse childhood experience was positively associated with impregnating a teenager, with ORs ranging from 1.2 (sexual abuse) to 1.8 (criminal in home). We found strong graded relationships ($P < .001$) between the number of adverse childhood experiences and the risk of involvement in a teen pregnancy for each of four birth cohorts during the last century. Compared with males with no adverse childhood experiences, a male with at least five adverse childhood experiences had an OR of 2.6 (95% confidence interval [CI] 2.0, 3.4) for impregnating a teenager. The magnitude of the ORs for the adverse childhood experiences was reduced 64–100% by adjustment for potential intermediate variables (age at first intercourse, number of sexual partners, having a sexually transmitted disease, and alcohol or drug abuse) that also exhibited a strong graded relationship to adverse childhood experiences.

CONCLUSION: Adverse childhood experiences have an important relationship to male involvement in teen pregnancy. This relationship has persisted throughout four successive birth cohorts dating back to 1900–1929, suggesting that the effects of adverse childhood experiences transcend changing sexual mores and contraceptive methods. Efforts to prevent teen pregnancy will likely benefit from preventing adverse childhood experiences and their associated effects on male behaviors that might mediate the increased risk of teen pregnancy. (Obstet Gynecol 2002; 100:37–45. © 2002 by The American College of Obstetricians and Gynecologists.)

Efforts to prevent teenage pregnancies^{1,2} seldom focus on the male role.³ Because reducing the number of teen pregnancies is a national priority,⁴ the scarcity of information about the male role presents an opportunity to investigate new avenues of prevention. In a retrospective study of adolescent mothers, Taylor et al⁵ identified demographic characteristics of adult men who impregnated a teenager. While providing an important description, that study did not examine life experiences that potentially increase the risk of male involvement in teen pregnancy. Moreover, they identified risk factors distinguishing only men aged 20 years or older at the time of the pregnancy, who were responsible for slightly less than half of the births of teenage mothers in their sample.⁵

The effects of childhood abuse can provide insight into behavioral pathways that lead to teen pregnancies. Relative to their peers, adolescents who have been physically or sexually abused or exposed to domestic violence have more sexual partners and earlier ages at first intercourse,^{6–15} are less likely to use contraception,¹⁶ more likely to use alcohol or drugs,^{6,17} and to consume alcohol before sex.⁹ Each of these behaviors could increase a male's risk of impregnating a teenage girl. Notably, adolescent males involved in a teen pregnancy report having more sexual partners, using condoms inconsistently or not at all, and higher rates of drug use and sexually transmitted diseases (STDs).¹⁸ In previous investigations, we found that the risks of alcoholism, drug

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abuse, sexual promiscuity, STDs, and unintended pregnancies increase as the number of adverse childhood experiences increases^{19,20} and that adverse childhood experiences usually occur in clusters^{19–21} and thus should be studied as a set of experiences rather than individually.²²

This investigation estimates the strength of the association between the following eight adverse childhood experiences and the risk of male involvement in a teen pregnancy: emotional, physical, and sexual abuse; having a battered mother; parental separation or divorce; and growing up with a substance abusing, mentally ill, or criminal household member. We chose these experiences because they are common and have deleterious effects on child development.^{19,20,23–27} We assessed the relationship between adverse childhood experiences and impregnating a teenager among four birth cohorts of men to determine whether our findings apply to the experiences of both younger and older males. In addition, we examined the effect of sexual behaviors and substance abuse on the adverse childhood experience–teen pregnancy relationship. To better assess the impact of adverse childhood experiences on a male’s risk of impregnating a teenager during both adolescence and adulthood,^{28–30} we report results separately for both males who were teenagers versus those who were more than 20 years old at the time of their involvement in a teen pregnancy.

MATERIALS AND METHODS

Data were collected at Kaiser Permanente’s Health Appraisal Clinic in San Diego, California, where more than 45,000 adult members undergo standardized examinations annually. A recent review of utilization records among Kaiser members in San Diego who were enrolled continuously between 1992 and 1995 showed that 81% of those aged 25 years and older had been evaluated at the Health Appraisal Clinic. Thus, persons enrolled in the Adverse Childhood Experience Study represent the majority of adult Kaiser members. In addition, the purpose of the visit to the clinic was for preventive services and a comprehensive medical evaluation rather than symptom or illness-based care.

The adverse childhood experience survey was conducted in two waves. Survey wave I included 13,494 Kaiser members who consecutively completed standardized medical evaluations at the clinic between August 1995 and March 1996; 70% (9508 of 13,494) responded by completing a mailed Adverse Childhood Experience Study questionnaire and became the study population (wave I) discussed in the initial adverse childhood experience

publications.^{19–21} Survey wave II included 13,330 persons who completed examinations between June and October of 1997; 65% (8667 of 13,330) responded. Thus, the final study cohort includes 18,175 persons with a response rate of 68% (18,175 of 26,824). Of these persons, 8037 were men and thus included in this analysis.

In addition to completing the Adverse Childhood Experience Study questionnaire, the standard medical evaluation and histories from the clinic were abstracted for every study participant and included in the Adverse Childhood Experience Study database. Because the Adverse Childhood Experience Study questionnaire was lengthy and contained questions about sensitive topics, we compared respondents with nonrespondents to assess possible bias in the study due to nonresponse. Specifically, we abstracted data from the standardized medical evaluations for both respondents and nonrespondents to the wave I Adverse Childhood Experience Study questionnaire. We found no differences between respondents and nonrespondents in their health risk behaviors (eg, smoking, alcohol, or drug abuse) or disease histories (eg, diabetes, hypertension, lung disease, cardiovascular diseases, or cancer).³¹

Male Involvement in Teen Pregnancy

Participants were asked, “Have you ever gotten someone pregnant?” If the answer was “yes,” they were then asked, “What was the age of the youngest woman you ever got pregnant?” and “How old were you then?” Any man who reported an age of 19 or less for the youngest woman he ever got pregnant was defined as having been involved in a teen pregnancy, regardless of his age at the time.

Definitions of Adverse Childhood Experiences

Questions about adverse childhood experiences specified that the experiences had to have occurred during the respondent’s first 18 years of life. The questions for the verbal and physical abuse and a battered mother categories were adapted from the Conflict Tactics Scale for which potential responses were never, once or twice, sometimes, often, or very often.³² Questions about contact sexual abuse were adapted from Wyatt.³³

The questions for the eight categories of adverse childhood experiences and the responses considered positive for an adverse childhood experience were as follows:

Verbal Abuse: 1) “How often did a parent, stepparent, or adult living in your home swear at you, insult you, or put you down?” and 2) “How often did a parent, stepparent, or adult living in your home threaten to hit you or throw something at you, but didn’t do it?” Responses of

“often” or “very often” to either question defined verbal abuse during childhood.

Physical Abuse: “Sometimes parents or other adults hurt children. While you were growing up, that is, in your first 18 years of life, how often did a parent, stepparent, or adult living in your home: 1) push, grab, slap, or throw something at you? or 2) hit you so hard that you had marks or were injured?” A response of “often” or “very often” to the first question or “sometimes,” “often,” or “very often” to the second defined childhood physical abuse.

Sexual Abuse: “Some people, during their first 18 years of life, had a sexual experience with an adult or someone at least 5 years older than themselves. These experiences may have involved a relative, family friend, or stranger. During the first 18 years of life, did an adult, relative, family friend, or stranger ever 1) touch or fondle your body in a sexual way, 2) have you touch their body in a sexual way, 3) attempt to have any type of sexual intercourse with you (oral, anal, or vaginal), or 4) actually have any type of sexual intercourse with you (oral, anal, or vaginal)?” A “yes” response to any of the four questions was defined as contact sexual abuse during childhood.

Battered Mother: “Sometimes physical blows occur between parents. While you were growing up in your first 18 years of life, how often did your father (or stepfather) or mother’s boyfriend do any of these things to your mother (or stepmother): 1) push, grab, slap, or throw something at her; 2) kick, bite, hit her with a fist, or hit her with something hard; 3) repeatedly hit her over at least a few minutes; or 4) threaten her with a knife or gun, or use a knife or gun to hurt her?” A response of “sometimes,” “often,” or “very often” to at least one of the first two questions or any response other than “never” to at least one of the third and fourth questions was defined as having had a battered mother.

Household Substance Abuse: This category consisted of two questions that asked whether the respondent had grown up in a household with a problem drinker or alcoholic²⁷ or anyone who used street drugs. A “yes” response to either question defined childhood exposure to household substance abuse.

Mental Illness in Household: A respondent who said that during his or her childhood, anyone was depressed or mentally ill or that anyone in the household had attempted suicide was defined as having grown up with mental illness in the household.

Parental Separation or Divorce: This was defined as a “yes” response to the question “Were your parents ever separated or divorced?”

Criminal Household Members: Having a household member go to prison while growing up was defined as

having childhood exposure to a household member who was a criminal.

The Adverse Childhood Experience Score

We summed the total number of individual adverse childhood experiences to create an adverse childhood experience score. The purpose of this score was to assess the cumulative effect of multiple adverse childhood experiences that have been shown to be highly interrelated.^{19,21} The adverse childhood experience score repeatedly has been shown to have a strong, graded relationship to numerous health and social problems.^{19–21,34,35}

Exclusions

Of the 8037 men who responded, we excluded 86 (1.1%) whose race was unstated and 22 (0.3%) whose educational attainment was not reported. We excluded 341 (4.3%) men who did not answer the questions about impregnating a female or did not provide the age of the youngest female they had impregnated, 162 (2.0%) who had impregnated a female and provided her age but not their own age at the time, and 27 (0.3%) who met our definition of sexual abuse but whose age at first abuse was older than their age at the time of the teen pregnancy. Thus, the final study sample included 92% of the men who responded to the surveys (7399 of 8037).

Data Analysis

We assessed both the relationship of each adverse childhood experience and the adverse childhood experience score (sum of the number of individual adverse childhood experiences; range 0–8) to the risk of involvement in a teen pregnancy and to the presence of variables that could be intermediate factors in the relationship between adverse childhood experiences and such involvement, including age at first intercourse, lifetime number of sexual partners, history of an STD, and alcohol or illicit drug abuse. We used logistic regression³⁶ to adjust for age, race, and educational attainment. To test for the significance of the graded relationship between the adverse childhood experience score and the risk of paternity in teen pregnancy, we entered the adverse childhood experience score as a single ordinal variable (range 0–8) into logistic models, with adjustment for demographic covariates. The coefficient for this ordinal adverse childhood experience score variable and its *P* value provide a statistical measure of the significance of any apparent graded relationships between the adverse childhood experience score and risk of involvement in teen pregnancy.

To determine whether changing social mores, methods of contraception, or other factors that have changed

with time influenced the relationship between adverse childhood experiences and male involvement in teen pregnancies, we assessed the relationship between the adverse childhood experience score and involvement in a teen pregnancy for the following four birth cohorts: persons born between 1900–1929, 1930–1945, 1946–1959, or 1960–1977.

Assessment of Intermediate Effects of Known Risk Factors

Finally, we assessed the potential intermediate role of known male risk factors^{6–15,17,18} in the relationship between the adverse childhood experience score and involvement in teen pregnancy. We did this by comparing the strength of the relationships between the adverse childhood experience score and involvement in teen pregnancy in logistic models with and without controlling for the potential intermediate variables (sexual behaviors and substance abuse). For this investigation, we defined potential intermediate variables as those that might be part of a causal pathway that may have been initiated by adverse childhood experiences. We use the term “intermediate” because we know of no universally accepted term, as some researchers prefer the term “mediation.” We consider these terms to have the same meaning and to be interchangeable. According to Rothman,³⁷ a confounding variable cannot be an intermediate step in the causal path between the exposure and the disease, as this assumption requires information outside the data. Rather, if the causal mechanism that might follow from exposure to disease would include the potentially confounding factor as an intermediate step, the variable is not a confounder.³⁷ Our proposed causal pathway between adverse childhood experiences and male involvement in teen pregnancy includes published factors for male involvement,^{6–15,17,18} which have also been shown to be strongly associated with adverse childhood experiences. Thus, our logistic models that enter the known risk factors simultaneously with the adverse childhood experience score (full model) treat these risk factors as potential intermediate variables, as recommended by Rothman.³⁷

RESULTS

The mean age of the respondents was 57 years (standard deviation [SD], 1.4 years; median, 58 years; range 19–94 years); 79% were white. Forty-six percent had graduated from college, and 34% had attended some college; 6% had not graduated from high school. The place of birth of the participants was geographically diverse (Table 1).

Table 1. Characteristics of the Study Cohort

Characteristic	<i>n</i>	Value
Age (y)	7399	
Mean (standard deviation)		57 (1.4)
Median (range)		58 (19–94)
Race/ethnicity (%)		
White	5836	79
Black	326	5
Hispanic	540	7
Asian	451	6
Other	246	3
Educational attainment (%)		
No high school diploma	442	6
High school graduate	1057	14
Some college	2486	34
College graduate	2519	46
Place of birth (U.S. census region) (%)*		
Northeast	465	14
Midwest	788	24
South	385	12
West (California = 28%)	1116	34
Foreign born	489	15
Not reported	67	2
Type of ACE (%) [†]		
Verbal abuse	572	8
Physical abuse	2269	31
Sexual abuse	1171	16
Battered mother	845	11
Household substance abuse	1772	24
Mental illness in the home	1118	15
Parental separation or divorce	1607	22
Criminal in home	297	4
ACE score (%)		
0	2768	37.4
1	2081	28.1
2	1223	16.5
3	646	8.7
4	377	5.1
≥5	304	4.1

ACE = adverse childhood event.

* Place of birth was available only for the second survey wave (*n* = 3310).

[†] Sample sizes presented for individual ACEs are the number who reported the ACE; categories are not mutually exclusive.

Prevalence of Adverse Childhood Experiences

Eight percent of the men reported childhood verbal abuse, 31% physical abuse, 16% sexual abuse, and 11% having a battered mother. Growing up with parents who separated or divorced, a household member who was a substance abuser, mentally ill, or a criminal was reported by 22%, 24%, 15%, and 4% of the men, respectively (Table 1). Nearly 63% reported at least one adverse childhood experience, and more than one third reported two or more.

Prevalence of Involvement in a Teen Pregnancy

Nineteen percent of the men reported impregnating a teenage girl. Mean male age at the time of the pregnancy

Table 2. Relationship of the Eight Adverse Childhood Experiences to the Prevalence and Risk (Adjusted Odds Ratio) of Involvement in a Teen Pregnancy

Adverse childhood experience		<i>n</i>	%	Adjusted OR (95% CI)*
Verbal abuse	No	6827	18.3	1.0 (referent)
	Yes	572	24.1	1.4 (1.1, 1.7)
Physical abuse	No	5130	18.0	1.0 (referent)
	Yes	2269	23.1	1.4 (1.3, 1.6)
Sexual abuse	No	6228	18.1	1.0 (referent)
	Yes	1171	22.0	1.2 (1.1, 1.4)
Battered mother	No	6554	17.5	1.0 (referent)
	Yes	845	28.1	1.6 (1.4, 1.9)
Substance abuse in home	No	5627	17.1	1.0 (referent)
	Yes	1772	23.9	1.5 (1.3, 1.7)
Mental illness in home	No	6281	18.3	1.0 (referent)
	Yes	1118	21.1	1.3 (1.1, 1.5)
Parents separated/divorced	No	5792	17.4	1.0 (referent)
	Yes	1607	23.5	1.4 (1.2, 1.6)
Criminal in home	No	7102	18.2	1.0 (referent)
	Yes	297	32.7	1.8 (1.4, 2.3)

OR = odds ratio; CI = confidence interval.

*Odds ratios adjusted for age at survey, race, and education.

was 20.6 years (SD 3.7 years; median 20 years); 58% were at least 20 years old when the pregnancy occurred. More than half of all reported teen pregnancies were definitely extramarital, as 53% reported their age at first marriage to be greater than their age when the teen pregnancy occurred, and 4% had never married. Forty percent of the men were married at the same age or younger than when the teen pregnancy occurred; however, 3% provided incomplete marital histories. The age of the teenage girls who were involved in these pregnancies ranged from 12 to 19 years (mean 17.7 years, SD 1.8 years; median, 18 years). Fifteen percent of the girls were aged 12–16 years; 17%, 17 years; 32%, 18 years; and 36%, 19 years.

Adverse Childhood Experiences and the Risk of Involvement in a Teen Pregnancy

Each adverse childhood experience was significantly associated with involvement in a teen pregnancy in the study cohort (Table 2). The odds ratios ranged from 1.2 for sexual abuse (95% confidence interval [CI] 1.1, 1.4) to 1.8 for growing up with a criminal in the home (95% CI 1.4, 2.3).

Adverse Childhood Experience Score and Involvement in Teen Pregnancy by Birth Cohort

We found a positive, graded relationship between the adverse childhood experience score and the likelihood of involvement in teen pregnancy for the total cohort and each of four successive birth cohorts dating back to 1900–1929. The strength of the relationship between the

adverse childhood experience score and involvement in teen pregnancy was somewhat stronger for the most recent (1960–1977) and the oldest (1900–1929) birth cohorts (Table 3).

Adverse Childhood Experiences, Sexual Behavior, and Substance Abuse

The adverse childhood experience score exhibited an inverse, graded relationship with age at first intercourse and with number of sexual partners (Table 4). Each adverse childhood experience was also associated with an increased risk of ever having an STD, problems with alcohol abuse, or using illicit drugs. A positive, graded relationship was seen between the adverse childhood experience score and each of those three behaviors (Table 4). For each birth cohort, we found a positive, graded relationship between the adverse childhood experience score and each of the five potential intermediate variables ($P < .001$) (data not shown). In addition, each of the five potential intermediate variables was strongly associated with involvement in a teen pregnancy ($P < .001$; data not shown).

Assessment of the Potential Intermediate Effects of Sexual Behaviors and Substance Abuse

For men of all ages, the adverse childhood experience score showed a positive, graded relationship with the risk of involvement in a teen pregnancy (Table 5). When we adjusted for the potential intermediate variables, including age at first intercourse, number of sexual partners, history of STD, alcohol abuse, and use of illicit drugs (model 2), we found that the risks (odds ratio) of involvement in a teen pregnancy were substantially reduced from model 1 for all adverse childhood experience scores (Table 5). The addition of the potential intermediate variables to model 2 significantly increased the log likelihood ratio ($\chi^2 = 154$, 8 degrees of freedom; $P < .001$). This indicates that the five potential intermediate variables account for significantly more variance in teen pregnancy involvement than was seen in model 1.

In separate analyses of men who were adolescents (≤ 19 years) or adults (≥ 20 years) when they were involved in a teen pregnancy, we found positive, graded relationships between adverse childhood experiences and involvement. Associations in the adolescent group were slightly stronger. Similarly, adverse childhood experiences were more strongly associated with the risk of involvement in a pregnancy with younger teenage girls (age ≤ 17 years) than with older teenagers (age 18–19 years) (data not shown).

Table 3. Relationship of the Adverse Childhood Experience Score to the Prevalence and Risk (Adjusted Odds Ratio) of Involvement in a Teen Pregnancy for the Total Cohort and by Birth Cohort

ACE score	n	Total cohort		1900–1929		1930–1944		1945–1959		1960–1977	
		%	Adjusted odds ratio*	%	Adjusted odds ratio*	%	Adjusted odds ratio*	%	Adjusted odds ratio*	%	Adjusted odds ratio*
0	2768	11.6	1.0 (referent)	13.6	1.0 (referent)	17.9	1.0 (referent)	16.0	1.0 (referent)	7.9	1.0 (referent)
1	2081	15.2	1.2 (1.0, 1.4)	13.9	1.1 (0.8, 1.4)	22.7	1.4 (1.1, 1.7)	16.6	1.0 (0.7, 1.4)	10.8	1.4 (0.7, 3.0)
2	1223	17.2	1.4 (1.2, 1.7)	15.8	1.2 (0.9, 1.8)	23.3	1.4 (1.0, 1.8)	20.9	1.3 (1.0, 1.9)	17.0	2.4 (1.1, 5.1)
3	646	17.6	1.6 (1.3, 2.0)	19.3	1.4 (0.8, 2.3)	26.5	1.6 (1.2, 2.3)	21.0	1.3 (0.9, 1.9)	20.6	3.1 (1.3, 7.0)
4	377	24.0	2.1 (1.6, 2.7)	26.8	2.6 (1.4, 4.8)	31.7	2.1 (1.4, 3.1)	23.3	1.4 (0.9, 2.3)	28.6	4.3 (1.9, 9.9)
≥5	304	26.8	2.6 (2.0, 3.4)	31.4	3.0 (1.4, 6.4)	31.4	2.0 (1.2, 3.3)	35.4	2.4 (1.6, 3.7)	37.7	5.7 (2.5, 13.2)
Total	7399	18.7	NA	16.1	NA	19.3	NA	22.3	NA	15.0	NA

NA = not applicable. Other abbreviation as in Table 1.

*Odds ratios adjusted for age at survey, race, and education; 95% confidence intervals in parentheses. $P < .001$ for the graded relationship between the ACE score and involvement in teen pregnancy within each birth cohort.

DISCUSSION

We found relationships between a wide range of common, interrelated adverse childhood experiences and men's risk of involvement in teen pregnancy. The number of experiences showed a strong, graded relationship with involvement in a teen pregnancy. Our results suggest that younger age at first intercourse, having more sexual partners, having had an STD, alcohol abuse, and use of illicit drugs might be intermediate variables in a chain of events that link adverse childhood experiences to involvement in teen pregnancy.

Because the behaviors we studied did not completely account for the relationship between adverse childhood experiences and the risk of paternity in teen pregnancy, there could be a direct effect of adverse childhood experiences as well as the presence of other intermediate variables not examined here, including characteristics of female partners, that increase the risk of pregnancy.^{20,38–42} Our results are consistent with those reported in other studies that have related these potential intermediate variables to male involvement in teen pregnancy.^{5–17,43–46} The prior studies, however, did not report

data about possible antecedents to these behavioral risk factors for teen paternity. The results of this investigation suggest that previously reported risk factors for involvement in teen pregnancy may be sequelae of exposure to childhood abuse, domestic violence, impaired parents, or other forms of household dysfunction.¹⁹

Although adverse childhood experiences were significantly associated with increased risk of paternity in teen pregnancy among males of all ages, they were more strongly linked among adolescent males and those who impregnated a younger teenage girl. This finding is consistent with the results of previous research documenting the effects of childhood abuse as a precipitant of premature sexual involvement^{10,47} and failure to use contraception.¹⁶

Because our survey was retrospective, we could not assess some potentially important pathways, including attitudes toward paternity and contraception^{48,49} and the characteristics of the teenage girls who became pregnant.^{38–42} Some men may have been unaware of teen pregnancies they caused, and others may not have admitted to them or misstated the age of the girl. Sexual

Table 4. Relationship Between the Adverse Childhood Experience Score and Potential Intermediate Variables

ACE score	n	Mean age (y) at first intercourse		Mean number of lifetime sexual partners		Ever had a sexually transmitted disease		Ever had a problem with alcohol abuse		Ever used illicit drugs	
		Crude	Adjusted (SD)*	Crude	Adjusted (SD)*	(%)	Adjusted odds ratio*	(%)	Adjusted odds ratio*	(%)	Adjusted odds ratio*
0	2768	19.5	18.9 (.08)	11.6	10.6 (.80)	11.6	1.0 (referent)	7.8	1.0 (referent)	10.3	1.0 (referent)
1	2081	18.8	18.3 (.09)	15.2	14.0 (.89)	15.2	1.2 (1.0, 1.4)	12.4	1.6 (1.3, 2.0)	16.8	1.6 (1.3, 1.9)
2	1223	18.3	17.8 (.11)	17.2	15.7 (1.10)	17.2	1.4 (1.2, 1.7)	17.4	2.4 (1.9, 2.9)	22.3	1.9 (1.6, 2.4)
3	646	17.9	17.5 (.15)	17.6	16.1 (1.46)	17.6	1.6 (1.3, 2.0)	19.8	2.8 (2.2, 3.5)	27.1	2.5 (2.0, 3.2)
4	377	17.1	16.9 (.19)	24.0	22.5 (1.86)	24.0	2.1 (1.6, 2.7)	26.0	3.9 (3.0, 5.1)	32.4	3.0 (2.3, 4.0)
≥5	304	16.3	16.3 (.22)	26.8	25.1 (2.08)	26.8	2.6 (2.0, 3.4)	38.5	6.5 (5.0, 8.6)	48.0	5.1 (3.8, 6.9)
Total	7399	18.7	NA	15.3	NA	10.7	NA	13.9	NA	18.2	NA

SD = standard deviation. Other abbreviations as in Tables 1 and 3.

*Adjusted for age at survey, educational attainment, and race using multiple linear regression; $P < .001$ for trend for each behavior; 95% confidence interval in parentheses.

Table 5. Relationship Between the Adverse Childhood Experience Score and the Prevalence and Risk (Adjusted Odds) of Involvement in a Teen Pregnancy With and Without Controlling for Possible Intermediate Variables Including Sexual Behaviors and a History of Alcohol or Illicit Drug Abuse

ACE score	<i>n</i>	Prevalence (%)	Model 1* adjusted odds ratio	Model 2*† adjusted odds ratio	Percent (%) of excess risk of ACEs accounted for by control for possible intermediates
0	2768	11.6	1.0 (referent)	1.0 (referent)	NA
1	2081	15.2	1.2 (1.0, 1.4)	1.0 (0.9, 1.2)	100
2	1223	17.2	1.4 (1.2, 1.7)	1.1 (0.9, 1.3)	75
3	646	17.6	1.6 (1.3, 2.0)	1.2 (1.0, 1.5)	67
4	377	24.0	2.1 (1.6, 2.7)	1.4 (1.1, 1.8)	64
≥5	304	26.8	2.6 (2.0, 3.4)	1.5 (1.1, 2.0)	69

Abbreviations as in Tables 1 and 3.

* Both model 1 and model 2 adjust for age at survey, educational attainment, and race using logistic regression; model 1 does not adjust for possible mediators; model 2 adjusts for possible mediators. $P < .001$ for trend for both models.

† The addition of the possible intermediate variables to model 2 significantly increased the log likelihood ratio compared with model 1 ($\chi^2 = 154$ with 8 degrees of freedom; $P < .001$).

abuse in this study was likely higher than reported because several studies of documented sexual abuse have found substantial underreporting.^{50,51} Although older men may have had poorer recall of these life events, the relationship between the adverse childhood experience score and involvement in a teen pregnancy was stronger in the oldest birth cohort than in the subsequent two birth cohorts. Moreover, if both the outcome (causing a teen pregnancy) and exposure (adverse childhood experiences) were underreported in our study, we have underestimated, not overestimated, the strength of their association.

Population-based studies have found levels of exposures nearly identical to ours. Specifically, we found that 16% of the men met the case definition for sexual abuse. In a recent nationally representative study of adults, 15% of men reported childhood sexual abuse.²⁶ In our study, 31% of the men had been physically abused as boys; the same percentage was found in a recent population-based study of Ontario men that used questions from the same scales.²⁵ These similarities suggest that our findings are likely to be generalizable.

Notably, males who were involved in teen pregnancies had a higher prevalence of adverse childhood experiences, which our results indicate are associated with alcohol or illicit drug abuse, STDs, increased prevalence of smoking, attempted suicide, and depression, as we previously reported.^{19,20} Furthermore, youth with a history of exposure to abuse and domestic violence are more likely to perpetrate violence or display antisocial behavior,⁵²⁻⁵⁶ and childhood experiences of sexual abuse or witnessing domestic violence have been linked to the perpetration of sexual violence during adolescence.⁵⁷ Thus, children born from these teen pregnancies are more likely to face adverse childhood experiences themselves, which would increase their own risk of

subsequent teenage pregnancy. Consequently, adverse childhood experiences likely contribute to an intergenerational cycle of these exposures^{58,59} and teen pregnancy.

In conclusion, throughout the 20th century boyhood exposure to adverse childhood experiences has been associated with involvement in teen pregnancies. This has been evident despite changing sexual mores, advances in contraceptive practices,⁶⁰ and the availability of elective abortion.⁴ One possible explanation for the persistence of this effect is that adverse childhood experiences are stressors whose biologic sequelae⁶¹ are not bound by societal norms but rather by effects on the developing child that lead to common emotional and behavioral outcomes.⁶² Regardless of the locus of this effect, interventions to prevent teen pregnancy are likely to be improved by prevention of adverse childhood experiences, additional research about male risk factors,³ and interruption of the intermediate pathways by which these experiences lead to an increased risk of paternity in teen pregnancy.

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