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Child Abuse and Smoking Among Young Women: The Importance of Severity, Accumulation, and Timing

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Abstract

Purpose—We examined the association between severity, accumulation, and timing of abuse in childhood and adolescence and smoking status among young women.

Methods—Retrospective self-reported childhood abuse was ascertained with the modified Conflict Tactics Scale from 91,286 Nurses Health Study II participants in 2001 (68,505 returned; 75.0% response rate). Childhood abuse was categorized by severity (mile/moderate/severe), type (physical/sexual), and timing (childhood/adolescence). Smoking status during adolescence was reported at baseline (1989). Logistic regression was used to predict smoking initiation by age 14 and smoking status between the ages of 15 and 19.

Results—A graded association between severity of abuse and early initiation of smoking (by age 14 years) was demonstrated (odds ratio [OR] = 1.9, 95% confidence interval [CI] = 1.7–2.1 for severe physical violence). Young women with both physical and sexual abuse were two times more likely to start smoking by age 14 than were those reporting no abuse (OR = 2.0, 95% CI = 1.8–2.3). Although abuse during childhood increased risk for adolescent smoking (OR = 1.7, 95% CI = 1.8–2.1) for those with childhood physical and sexual abuse, inclusion of adolescent physical and sexual abuse (OR = 2.2, 95% CI 2.1–2.4) diminished the impact of childhood abuse (OR = 1.1, 95% CI 1.1–1.2). The degree of familial emotional support was protective against smoking, and reduced the impact of abuse by 40% among those with high emotional support versus those without ($p < .0001$).

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Conclusions—A strong and graded association was observed between both severity and accumulation of abuse and the risk of early initiation of smoking among girls. Smoking status during late adolescence was more strongly associated with adolescent abuse than childhood abuse. Early smoking onset is associated with both heightened risk for disease in adolescence but also increased morbidity and mortality in adulthood. Identifying and intervening in potentially modifiable risk factors for smoking onset in young women, such as early-life physical and sexual abuse, and building familial strengths, such as emotional support, may have significant public health implications.

Keywords

Smoking initiation; Childhood abuse; Young women

Tobacco smoking is among the most popular addictive behaviors initiated and established during adolescence. In 2006, about half of the high school seniors reported that they have smoked a cigarette in their life time, and one out of five high school senior girls smoked cigarette in the last 30 days [1]. Nearly all first use occurs before high school graduation, typically by age 16 [2].

Cigarette smoking during childhood and adolescence produces significant health problems among young people, including an increased number and severity of respiratory illnesses, and potential restriction in the rate of lung growth [3]. Early initiation of smoking is associated with the development of more severe levels of nicotine addiction [2]; consequently, people who begin smoking earlier are more likely to suffer from harmful health consequences of smoking in later life, including lung, kidney, and bladder cancer and coronary health diseases [4]. Moreover, studies have suggested adverse smoking effects on pulmonary function were greater in women than in men [5]. Therefore, identifying modifiable risk factors for early onset of smoking among girls may have significant public health impact.

Abuse during childhood and adolescence has been associated with poor physical and mental health outcomes, behavioral problems, and poor academic achievement [6,7]. However, until recently, few studies explored the impact of timing of abuse on health and developmental outcomes. Numerous studies document a relation between early-life maltreatment and abuse and risk for future psychopathology and emotional distress [8,9]. Thornberry et al [6] found that adolescent abuse has stronger and more negative behavioral consequences, (including delinquency, drug use, teenage pregnancy, and school failure) than abuse experienced in childhood alone. Smoking behaviors were not examined in this study. Kaplow and Widom [10] found that although an earlier onset of childhood abuse predicted more symptoms of anxiety and depression in adulthood, later onset of childhood abuse was a more salient predictor, that is, predictive of more behavioral problems in adulthood.

Prior research studies have documented an association between childhood stress and early smoking initiation [11,12]. However, these studies have suffered from a shared limitation—inability to compare the relative impact of characteristics of abuse, including developmental stage, severity, type, and timing. We extend the literature as this study investigates the role of severity, type, and timing of abuse and smoking behavior among adolescent girls. Our goal here was twofold. First, we examined whether severity and type of abuse was associated with early onset of smoking. We hypothesized that (1) severe abuse in childhood would be more strongly associated with early smoking initiation compared with less severe abuse or no abuse; and (2) those who experienced multiple types of abuse would be more likely to initiate smoking early compared with those who experienced a single type or no abuse. Second, we examined the association between the timing and type of abuse with

smoking behavior in adolescence. We hypothesized that (1) abuse in adolescence would be more strongly associated with smoking initiation in adolescence compared with abuse occurring earlier in childhood; (2) the combination of both physical and sexual abuse rather than either type of abuse alone would be more strongly associated with smoking initiation. In additional analyses we considered the potential buffering effects of social support, hypothesizing that emotional support from family member would be protective against adverse smoking behavior in adolescents when exposed to social adversities such as abuse.

Patients and Methods

Study population

The Nurses Health Study (NHS) II is an ongoing prospective study. A total of 116,608 female registered nurses between the ages of 25 and 42 years at the initiation of the study in 1989 completed a mailed questionnaire on their medical history and lifestyle. Follow-up questionnaires, mailed every 2 years to the entire cohort, updated information on the occurrence of diseases and health-related behaviors including smoking status. Detailed information on this study can be obtained online [13].

A supplementary questionnaire designed to ascertain abuse experience across the life cycle was mailed in 2001 to 91,286 study participants (excluding those who had previously requested short-form questionnaires only or those who required more than four mailings before responding to the previous biennial follow-up questionnaire in 1999). Nonrespondents received a postcard to remind them to return the supplemental questionnaire. Questionnaires were returned by 68,505 women (response rate of 75.0%). This study was approved by both the institutional review board at Brigham and Women's Hospital and the Human Subjects Committee at the Harvard School of Public Health. Voluntary completion and return of the supplementary questionnaire was an indicator of consent.

Measures of exposure to violence

The questionnaire included assessment of physical and sexual abuse. Subjects were asked to answer for two distinct developmental periods: childhood (up to age 11 years) and adolescence (ages 11–17 years).

Physical abuse—Physical abuse was measured with questions adapted from the Revised Conflict Tactics Scale [14], which queries whether a participant's parent, step-parent, or adult guardian ever did the following to them: pushed, grabbed, or shoved; kicked, bit, or punched; hit with something that hurt; choked or burned; or physically attacked in some other way. For each type of physical abuse, respondents were asked about the frequency of the event (never, once, a few times, more than a few times). A categorical physical abuse severity scale for childhood was created with a minimum score of 0 = *no physical abuse*, 1 = *mild physical abuse*, 2 = *moderate physical abuse*, and 3 = *severe physical abuse*. Those who had abuse experiences in several categories (e.g., those who experienced both mild and severe abuse) were classified as having the highest severity category (for the definition of each category, see Appendix 1).

Sexual abuse—Sexual abuse was measured with questions modified from a national telephone survey conducted by the Gallup Organization in 1995 [15,16]. Items included a question on forced sexual touching, “Were you ever touched in a sexual way by an adult or an older child or were you forced to touch an adult or an older child in a sexual way when you did not want to?” and a question on forced sexual activity, “Did an adult or older child ever force you or attempt to force you into any sexual activity by threatening you, holding

you down, or hurting you in some way when you did not want to?" Exposure to sexual abuse during childhood was categorized into three groups: 0 = *no experience of abuse*, 1 = *being touched in a sexual way*, or 2 = *being forced into sexual activity*.

Co-occurrence of violence types—We created two scales to measure combined exposure of physical and sexual abuse. The categorical childhood abuse scale and the categorical adolescence abuse scale included abuse during each respective developmental period, scored 0 = *no abuse*, 1 = *physical abuse only*, 2 = *sexual abuse only*, and 3 = *both physical and sexual abuse*.

Outcomes: early smoking initiation (by age 14) and smoking status between ages 15 and 19

Our main outcome was smoking status during adolescence. In the baseline survey administered in 1989, women were asked whether they had smoked 20 packs of cigarettes in their lifetime. If they answered "yes," they were asked about the average number of cigarettes smoked (1) by 14 years of age, (2) between ages 15 and 19 years, and (3) in older age periods. We used this information to create (1) an early adolescent smoking onset by 14 years old and (2) smoking status between ages 15 and 19, which was defined as those who reported smoking between ages 15 and 19 years regardless of their smoking status by age 14 years.

Other covariates

Potential confounders were identified based on theoretical and empirical data from the literature. We considered race/ethnicity, age, and parental smoking during childhood as potential confounders. Studies have found that social/parental support can protect against negative effects associated with early childhood adversity [17,18]. Subjects were asked if "someone in my family made me feel important or special," with response options as never, rarely, sometimes, often and very often. Presence of a caring family member was modeled as a categorical variable.

Indicators of the childhood psychosocial environment, such as socioeconomic status (SES), have been linked to earlier smoking onset [2] and to exposure to violence [19], and thus were also examined as confounders. Data on childhood SES was available only on a subset of our sample. Among the NHS II participants used in these analyses, 30,562 of their mothers also participated in the Maternal Cohort Study in 2000, responding to a mailed questionnaire ascertaining information on childhood SES of the nurse participant including the educational level of their mother and father, and whether their parents owned their home at the time of the nurse participant's birth. Maternal education was used in our models, as it is the most stable indicator of SES; however, similar association between SES and smoking initiation was found for all three variables.

Statistical analysis

We first estimated the odds of smoking onset by age 14 years among women reporting a history of abuse during childhood compared with those reporting no abuse with a sample of 68,107 women (after excluding 398 participants who were missing data on childhood abuse). Next, we estimated the odds of smoking between ages 15 to 19 comparing women reporting abuse in childhood only, adolescence only, or abuse occurring in both developmental periods Sample size for this analysis was 67,972 after excluding 135 participants who were missing data on adolescence abuse.

We used logistic regression to calculate odds ratios (ORs) and 95% confidence intervals (CIs), adjusting for control variables available on the entire sample. When we examined the

relationship between a specific type of abuse and smoking, first we adjusted for demographic information such as race/ethnicity, age at baseline, and other types of abuse, if applicable, that occurred during the same period to estimate the net association (Model 1). Model 2 included all variables in Model 1 and parental smoking status during childhood, a known confounding factor for child's smoking. In Model 3, we included all variables in Model 2 and the measure of emotional support. In the subset analyses considering information available from the Maternal Cohort Study, we further adjusted for indicators of childhood SES (mother's education, father's education, home ownership at time of the nurse participant's birth) to investigate whether the association between abuse and smoking onset was confounded by childhood SES.

Results

Sample characteristics are shown in Tables 1 and 2. Notably, 4.8% of women reported having started smoking before they reached age 15, and 23.0% reported smoking between the ages of 15 and 19.

Childhood abuse and smoking onset by age 14 years

Both physical and sexual abuse experienced during the first 11 years of life independently, and significantly increased the risk of early initiation of smoking in crude and adjusted analyses (Table 3). Severity of physical abuse was associated with odds of early onset smoking in a graded fashion. Those with severe physical abuse had a twofold risk of smoking initiation compared to those with no abuse, controlling for possible confounders (OR = 1.9, 95% CI: 1.7–2.1).

The co-occurrence of physical and sexual abuse during childhood increased risk of early smoking onset (OR = 2.0, 95% CI: 1.8–2.3) above that of those reporting a single type of abuse alone (physical abuse only OR = 1.3, 95% CI: 1.2–1.4) or sexual abuse only (OR = 1.5, 95% CI: 1.3–1.7).

In subset analyses, entering maternal education, paternal education, and home ownership into the models did not further attenuate the relationship between reported abuse in childhood and early smoking initiation risk (data not shown, will be available upon request).

Cumulative abuse and smoking onset between ages 15 and 19

Table 4 presents the relationship between time-specific measures of abuse and smoking between ages 15 and 19. We evaluated the impact of type of abuse during each developmental period. Type of childhood abuse had a strong and graded association with smoking status at ages 15–19. Those who experienced childhood physical and sexual abuse had a higher risk for smoking than those who experienced a single type of abuse or no exposure. The same pattern persisted for adolescent abuse (OR =1.6 for physical abuse and 1.5 for sexual abuse, and 2.1 for both physical and sexual abuse). Inclusion of adolescent abuse diminished the strength of the relation between childhood abuse and smoking status, although the impact remained statistically significant (Table 4).

Discussion

Our findings support a consistent relation between several characteristics of childhood and adolescent abuse (timing, accumulation, and severity) and smoking behavior among adolescent girls. Exposure to physical and/or sexual abuse during childhood increased risk of smoking initiation prior to 14 years of age. A strong and graded association was found between severity of childhood physical abuse and risk for early smoking initiation. Moreover, smoking during ages 15 to 19 was more strongly related to abuse experienced in

recent years (adolescence) than abuse in remote years (childhood). Exposure to multiple forms of abuse was associated with the greatest risk for smoking behavior in both developmental periods. Finally, familial emotional support significantly reduced the risk for early onset of smoking. This is the first study to establish a graded association between severity, accumulation, and timing of abuse and smoking behavior among adolescents.

Our findings corroborate previous research in girls. Anda et al [11] demonstrated that early smoking initiation among girls was 6%, which is comparable to our finding of 5% and reported a twofold increase in early onset of smoking among both girls and boys who experienced verbal, physical, or sexual childhood abuse. Acierno el al [20] also found that 6% of girls smoked at age 14 and 21.4% of girls smoked at age 17. Diaz et al [21] found that girls who were victims of physical or sexual abuse had a threefold increase in regular smoking compared to girls who did not report abuse. In addition, the current study strengthens these findings given the demonstrated dose–response relation between severity of abuse and smoking onset.

Abuse during adolescence and persistent abuse from childhood to adolescence appear to be more important risk factors for adolescent smoking than childhood-only abuse. Our data also corroborates the findings of Thornberry and colleagues [6]. In the study of boys and girls, they found maltreatment during adolescence and persistent maltreatment have stronger and more consistent negative consequences than does maltreatment experienced only in childhood on adverse health behaviors, although that study did not examine smoking specifically [6]. There are several possible hypotheses to explain this pattern. Garbarino et al [22] have argued that adolescents may be particularly stressed by adverse conditions they cannot avoid and are more likely than younger children to react to these experiences by engaging in various forms of antisocial behavior. Similarly, adolescence is a stage of life that promotes attempts at greater independence and autonomy by the child and greater control by the parent, a tension that Straus [23] suggests may be exacerbated in families with harsh parenting styles.

Although several studies have suggested that specific types of abuse are more central to smoking initiation, sexual abuse [11,12], or physical abuse [21], several have suggested that different types of abuse exert similar effects [20]. Increasingly, the literature supports cumulative effects of multiple co-occurring types of violence. Our finding that cumulative exposure to both physical and sexual abuse has the strongest impact on smoking behavior is consistent with a study by Nichols and Harlow [12], which examined retrospectively the effect of physical and sexual abuse during childhood with a sample of 722 middle-aged women, showing that women with a history of both physical and sexual abuse had a 3.5-fold greater likelihood of smoking onset after age 12 than did women with no abuse history.

The stress-coping theory [24] posits that emotional or instrumental support from parents may help adolescents to cope with problems from school, home, or family domains, and may help them deal with emotional states such as anxiety, depression, or anger [25,26]. With parents' support, adolescents become better at regulating their emotions and at problem solving [27–29]. There has been a considerable amount of research showing that social support is inversely related to substance use [30–32]. Parental support, measures of closeness, confiding in the parent–child relationship, and adolescents' perceived support from parents are related to better mental health outcomes and to lower likelihood of substance use among adolescents [17,33–35]. Several studies have demonstrated that the parental emotional support buffers the relation between negative life events and adverse outcomes [17,18,33]. This notion was supported in these analyses by showing that if a child had a person who made her feel special during childhood, the child's odds of smoking onset in early age decreased by 40%.

One potential pathway between abuse and smoking is through the mental health consequences of abuse such as depression and/or anxiety. Studies have demonstrated that childhood abuse is associated with poorer mental health in adolescence [36,37]. Psychiatric disorders, in turn, have been associated with the increased risk of daily smoking [38,39].

Strengths

Our analysis expands the literature in this area in a number of important ways. Our approach to the analysis strengthens the inference that the observed association represents a cause-and-effect relationship in light of a number of epidemiologic criteria for causality: strength of the association; reduced likelihood of alternative explanations because of confounding given that we were able to control for a number of relevant confounders; more adequately accounting for the temporal sequence of events; demonstration of a dose–response relationship; and consistency of our findings with those from studies in different populations as noted above [40].

Limitations

This study also has several limitations that are worth noting. Analyses are based on retrospective data on both abuse and reported age at smoking onset. Women with a history of abuse may be less able to recall events accurately because of traumatic amnesia—the inability to recall painful memories often associated with trauma—and posttraumatic stress disorder [41–43]. Widom and Morris [44,45] demonstrated underreporting of both physical and sexual abuse during childhood among adult survivors of such abuse. However, these studies also demonstrate that self-report measures have strong discriminant validity and predictive efficacy [44,45]. Those who started smoking early may be more likely to consider early childhood events as abusive or tend to recall more negative childhood experiences, which might also introduce bias. If inaccuracy of reported abuse were associated with the reporting of early initiation of smoking, the bias would be systematic and nonrandom, and would tend to drive the results toward the null. However, because the participants reported smoking initiation in 1989 and reported exposure to violence in 2001, the report of smoking initiation was unlikely to have been influenced by the reporting of violence, which minimizes the chance that this type of bias explains our results.

These analyses allowed us to examine the influence of childhood abuse on the risk of smoking initiation among those who go on to become established smokers (i.e., those smoking more that 20 packs of cigarettes in their lifetime). We were thus unable to differentiate experimenters from regular established smokers.

Another limitation is the genealizability of our data. First, our data is based solely on women, so the results are not necessarily applicable to young males. Second, our cohort was relatively homogeneous with respect to SES given the absence of women whose educational level was less than a college degree. Although the homogeneity of educational status in our sample limits the generalizability of our study, the homogeneity of SES is arguably a strength as well. Specifically, because SES is strongly associated with both abuse experience and smoking, we were able to minimize the possibility of confounding of our results by SES. A third limitation is the temporal association of the predictor and outcome. Because the time frame of violent victimization during preadulthood was ascertained at ages 0–11 and 11–17, the abuse and smoking at ages 15–19 potentially overlap. Although violent victimization by age 11 precedes smoking initiation before age 15, we cannot conclude that women who reported smoking before age 15 did not smoke before age 11. Fourth, confounding is an important issue in any observational study. Early-life violence may be correlated with other unmeasured factors that are related to early onset of smoking. Several plausible confounding variables that are associated with both violence victimization and

smoking initiation include low SES; dysfunctional families with neglect [46,47], marital violence, and alcohol abuse [47], and peer influence on exposure to both violence [48] and smoking [49]. By examining the association of the participant's childhood SES (e.g., parental SES) and smoking initiation using a subsample, we were able to show that the association between violence exposure and age at smoking initiation was not further attenuated. However, because of our otherwise limited data on childhood characteristics, such as family structure and other social factors, we were unable to control further for these potential confounders.

Conclusion

The developmental timing, cumulative type, and severity of abuse are important risk factors for smoking initiation during adolescence. Our finding that the children with a caring family member were less likely to start smoking in early childhood suggests that there are mechanisms to improve coping with social adversities. Future research to understand the processes by which children overcome social adversities is important to the development of effective interventions. Identifying and intervening in potentially modifiable risk factors for smoking onset in youth are likely to have significant public health implications.

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Appendix 1

Categorical physical abuse severity scale

Severity	Description	Frequency
Mild	Being pushed, grabbed, or shoved	Ever
	Being kicked, bitten, or punched	Once
	Being hit with something that hurts the body	Once
Moderate	Being hit with something that hurts the body	A few times or more
	Being attacked in some other way	Once
Severe	Being kicked, bitten, or punched	A few times or more
	Being choked or burned	Ever
	Being physically attacked in some other way	A few times or more

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Table 1

Distribution and percentage of smoking by characteristics of participating nurses

Variable	N (%)	% Smoked <15	*p*-value*	% Smoked 15–19	*p*-value*
Total	68,107 (100.0)	4.8		23.0	
Age started smoking					
Before 15	3,287 (4.8)				
Age 15–19	12,496 (18.4)				
Age 20 or older	7,063 (10.4)				
Never started smoking	45,261 (66.5)				
Smoking status ages 15–19					
No smoking	52,426 (77.0)				
Smoking	15,681 (23.0)				
Age at 1989			<.0001		<.0001
24–29	11,174 (16.4)	5.9		19.1	
30–34	21,243 (31.2)	5.7		22.9	
35–39	22,910 (33.6)	4.0		21.7	
40–44	12,780 (18.8)	4.0		23.3	
Race/ethnicity			<.0001		<.0001
Non-Hispanic white	63,413 (94.4)	4.9		23.4	
Non-Hispanic black	801 (1.2)	3.3		16.7	
Hispanic	860 (1.3)	3.3		16.9	
Asian	963 (1.4)	2.2		9.7	
Other	1,141 (1.7)	4.9		21.3	
Parental smoking			<.0001		<.0001
None	23,888 (35.3)	2.9		16.3	
Mom smoked	5,448 (8.0)	7.3		29.4	
Dad smoked	19,261 (28.4)	4.4		23.5	
Both parents smoked	19,160 (28.3)	7.0		29.0	
Family emotional support			<.0001		<.0001
Very often	27,903 (41.0)	3.9		20.7	
Often	18,783 (27.6)	4.5		22.4	

Variable	N (%)	% Smoked <15	*p*-value*	% Smoked 15–19	*p*-value*
Sometimes	12,468 (18.3)	5.9		25.5	
Rarely	6,753 (9.9)	6.7		28.2	
Never	2,098 (3.1)	7.1		27.5	
Mother's education[a]			0.674		0.086
Less than high school	4,161 (13.7)	4.8		20.6	
High school graduate	15,150 (49.9)	4.4		22.2	
Some college	7,867 (25.9)	4.4		21.8	
College graduate or more	3,210 (10.6)	4.6		20.9	

*Chi-square test for difference between smoking and nonsmoking groups.

[a]Measured among the 30,562 participants whose mothers completed the Mother's Questionnaire.

Table 2
Distribution and percentage of smoking by abuse experience

Variable	N (%)	% Smoked[a]	*p*-value[*]
Childhood (ages 0–11)			
Severity of physical abuse			<.0001
None	34,731 (51.0)	3.8	
Mild	11,127 (16.3)	5.1	
Moderate	17,525 (25.7)	5.5	
Severe	4,724 (6.9)	9.0	
Severity of sexual abuse			<.0001
None	53,786 (79.0)	4.3	
Touch	10,173 (14.9)	6.7	
Touch and/or forced sex	4,148 (6.1)	7.7	
Physical and sexual abuse			<.0001
None (reference)	29,251 (43.0)	3.5	
Physical violence only	24,535 (36.0)	5.1	
Sexual violence only	5,480 (8.1)	5.5	
Both physical and sexual violence	8,841 (13.0)	7.9	
Adolescence (ages 11–17)			<.0001
None	38,153 (56.1)	18.4	
Physical abuse only	15,296 (22.5)	27.9	
Sexual abuse only	7,682 (11.3)	25.7	
Both physical and sexual abuse	6,841 (10.1)	34.8	

[a] For abuse during childhood, % smoked prior to age 15, and for abuse during adolescence, % smoked between ages 15 and 19.

[*] Chi-square test for difference between smoking and nonsmoking groups.

Table 3

Odds ratios and 95% confidence intervals of early adolescent smoking initiation (<age 15) by type of abuse during childhood: NHSII (N = 68,107)

Variable	Model 1		Model 2		Model 3	
	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value
Severity of physical violence						
None	1.0		1.0		1.0	
Mild	1.3 (1.2–1.5)	<.0001	1.3 (1.1–1.4)	<.0001	1.2 (1.1–1.3)	.000
Moderate	1.4 (1.3–1.5)	<.0001	1.4 (1.3–1.5)	<.0001	1.3 (1.2–1.4)	<.0001
Severe	2.3 (2.0–2.5)	<.0001	2.1 (1.9–2.4)	<.0001	1.9 (1.7–2.1)	<.0001
Severity of sexual violence						
None	1.0		1.0		1.0	
Touch	1.6 (1.4–1.7)	<.0001	1.5 (1.4–1.7)	<.0001	1.5 (1.4–1.6)	<.0001
Touch and/or forced sex	1.6 (1.4–1.8)	<.0001	1.5 (1.3–1.7)	<.0001	1.4 (1.3–1.6)	<.0001
Age at baseline	1.0 (1.0–1.0)	<.0001	1.0 (0.9–1.0)	<.0001	1.0 (0.9–1.0)	<.0001
Race/ethnicity						
White, non-Hispanic	1.0		1.0		1.0	
Black, non-Hispanic	0.6 (0.4–0.9)	.013	0.6 (0.4–0.9)	.018	0.6 (0.4–1.0)	.028
Hispanic	0.6 (0.4–0.8)	.003	0.6 (0.4–0.9)	.014	0.6 (0.4–0.9)	.015
Asian	0.4 (0.3–0.6)	<.0001	0.5 (0.3–0.7)	.001	0.5 (0.3–0.7)	.001
Others	1.0 (0.7–1.3)	.848	1.0 (0.7–1.3)	.856	1.0 (0.7–1.3)	.803
Parental smoking during childhood						
None smoked			1.0		1.0	
Father smoked			1.5 (1.4–1.7)	<.0001	1.5 (1.4–1.7)	<.0001
Mother smoked			2.5 (2.2–2.9)	<.0001	2.5 (2.2–2.8)	<.0001
Both parents smoked			2.4 (2.2–2.7)	<.0001	2.4 (2.2–2.6)	<.0001
Emotional support from family member*						
Never					1.0	
Rarely					0.9 (0.8–1.1)	.517
Sometimes					0.9 (0.7–1.1)	.282
Often					0.8 (0.6–0.9)	.003

Variable	Model 1		Model 2		Model 3	
	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value
Very often					0.7 (0.6–0.8)	<.0001
Physical and sexual violence						
None (reference)	1.0		1.0		1.0	
Physical violence only	1.5 (1.4–1.6)	<.0001	1.4 (1.3–1.5)	<.0001	1.3 (1.2–1.4)	<.0001
Sexual violence only	1.6 (1.4–1.8)	<.0001	1.6 (1.4–1.8)	<.0001	1.5 (1.3–1.7)	<.0001
Both physical and sexual violence	2.5 (2.2–2.7)	<.0001	2.3 (2.1–2.5)	<.0001	2.0 (1.8–2.3)	<.0001
Age at baseline	1.0 (1.0–1.0)	<.0001	1.0 (0.9–1.0)	<.0001	1.0 (0.9–1.0)	<.0001
Race/ethnicity						
White, non-Hispanic	1.0		1.0		1.0	
Black, non-Hispanic	0.6 (0.4–0.9)	.010	0.6 (0.4–0.9)	.015	0.6 (0.4–0.9)	.025
Hispanic	0.6 (0.4–0.8)	.004	0.6 (0.4–0.9)	.017	0.6 (0.4–0.9)	.017
Asian	0.4 (0.3–0.6)	<.0001	0.5 (0.3–0.7)	.001	0.5 (0.3–0.7)	.001
Others	1.0 (0.7–1.3)	.886	1.0 (0.7–1.3)	.902	1.0 (0.7–1.3)	.826
Parental smoking during childhood						
None smoked			1.0		1.0	
Father smoked			1.6 (1.4–1.7)	<.0001	1.5 (1.4–1.7)	<.0001
Mother smoked			2.5 (2.2–2.9)	<.0001	2.5 (2.2–2.8)	<.0001
Both parents smoked			2.4 (2.2–2.7)	<.0001	2.4 (2.2–2.7)	<.0001
Emotional support from family member*						
Never					1.0	
Rarely					0.9 (0.8–1.1)	.368
Sometimes					0.9 (0.7–1.0)	.094
Often					0.7 (0.6–0.8)	<.0001
Very often					0.6 (0.5–0.8)	<.0001

CI = confidence interval; OR = odds ratio.

* $p < .0001$ for trend test.

Table 4

Odds ratios and 95% confidence intervals of adolescent smoking (ages 15–19) by timing and type of abuse: NHSII (N = 68,107)

Variable	Model 1: childhood only		Model 1: childhood and adolescence		Model 2		Model 3	
	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value
Physical and sexual abuse								
Childhood								
None	1.0		1.0		1.0		1.0	
Physical abuse only	1.4 (1.4–1.5)	<.0001	1.1 (1.0–1.1)	<.0001	1.1 (1.0–1.1)	.004	1.1 (1.0–1.1)	.023
Sexual abuse only	1.3 (1.2–1.4)	<.0001	1.2 (1.1–1.3)	<.0001	1.2 (1.1–1.3)	<.0001	1.2 (1.1–1.3)	<.0001
Both physical and sexual abuse	1.7 (1.6–1.8)	<.0001	1.1 (1.1–1.2)	<.0001	1.1 (1.0–1.2)	.005	1.1 (1.0–1.1)	.040
Adolescence								
None			1.0		1.0		1.0	
Physical abuse only			1.6 (1.6–1.7)	<.0001	1.6 (1.5–1.7)	<.0001	1.6 (1.5–1.7)	<.0001
Sexual abuse only			1.5 (1.4–1.6)	<.0001	1.5 (1.4–1.6)	<.0001	1.5 (1.4–1.5)	<.0001
Both physical and sexual abuse			2.2 (2.1–2.4)	<.0001	2.2 (2.0–2.3)	<.0001	2.1 (2.0–2.3)	<.0001
Age at baseline	1.0 (1.0–1.0)	<.0001	1.0 (1.0–1.0)	<.0001	1.0 (1.0–1.0)	<.0001	1.0 (1.0–1.0)	<.0001
Race/ethnicity								
White, non-Hispanic	1.0		1.0		1.0		1.0	
Black, non-Hispanic	0.6 (0.5–0.7)	<.0001	0.6 (0.5–0.7)	<.0001	0.6 (0.5–0.7)	<.0001	0.6 (0.5–0.7)	<.0001
Hispanic	0.6 (0.5–0.7)	<.0001	0.6 (0.5–0.7)	<.0001	0.6 (0.5–0.8)	<.0001	0.6 (0.5–0.7)	<.0001
Asian	0.3 (0.3–0.4)	<.0001	0.3 (0.3–0.4)	<.0001	0.4 (0.3–0.5)	<.0001	0.4 (0.3–0.5)	<.0001
Others	0.9 (0.8–1.0)	.075	0.9 (0.7–1.0)	0.044	0.9 (0.7–1.0)	.048	0.9 (0.7–1.0)	.044
Parental smoking during childhood								
None smoked					1.0		1.0	
Father smoked					1.5 (1.4–1.6)	<.0001	1.5 (1.4–1.6)	<.0001
Mother smoked					2.0 (1.9–2.2)	<.0001	2.0 (1.9–2.2)	<.0001
Both parents smoked					2.0 (1.9–2.0)	<.0001	1.9 (1.9–2.0)	<.0001
Emotional support from family member*								
Never							1.0	
Rarely							1.0 (0.9–1.2)	.573
Sometimes							1.0 (0.9–1.1)	.849

Variable	Model 1: childhood only		Model 1: childhood and adolescence		Model 2		Model 3	
	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value	OR (95% CI)	*p*-value
Often							0.9 (0.8–1.0)	.161
Very often							0.9 (0.8–1.0)	.060

CI = confidence interval; OR = odds ratio.

* $p < .0001$ for trend test.