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## Exposure to Parental Cigarette Smoking and Child Problem Behaviors: A Longitudinal Study

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### Abstract

This study examined exposure to environmental tobacco smoke (ETS). A major public health problem, ETS has been found to be associated with an increased risk of adverse health effects in children. This study utilizes data from a community-based, longitudinal investigation examining the relation between children's exposure to ETS and later internalizing symptoms and externalizing behaviors. Interviews were administered to a representative community sample of participants from two New York State counties in 1983, with subsequent interviews in 1985–1986, 1992, 1997, and 2002–2003 (when the participants' mean age was 32). Data was collected on various personality and behavioral characteristics of the participants, and on internalizing symptoms and externalizing behaviors demonstrated by their children. Results indicated that children's exposure to ETS was associated with an increased risk for both internalizing symptoms and externalizing behaviors. This relationship was maintained despite control on a number of parental psychosocial risk factors (e.g., demographic variables, personality and behavioral attributes) that have been found to be associated with both parental cigarette smoking and behavior problems among children. These data, which indicate an association between exposure to ETS and internalizing symptoms and externalizing behaviors among children, support public health policies to further restrict children's exposure to ETS.

### Keywords

Parental cigarette smoking; Child-rearing practices; Environmental tobacco smoke; ETS; Effects of parental cigarette smoking on children; Effects of ETS on children; Internalizing behaviors; Externalizing behaviors

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Internalizing symptoms refer to overlapping symptoms of depression and anxiety and somatic complaints (Achenbach, 1991). Previous research has documented that internalizing symptoms in childhood predict depression during adolescence (Rose, Rose, and Feldman, 1989). Externalizing behaviors (i.e., aggression, delinquency) predict later problem behaviors including drug use and antisocial behavior (Brook, Whiteman, Finch, and Cohen, 1996), as well as psychiatric disorders (Brook, Richter, and Rubenstone, 2000). Therefore, it is important to identify the predictors of internalizing symptoms and externalizing behaviors among children. The present longitudinal study focuses on one important predictor of internalizing symptoms and externalizing behaviors, namely, children's exposure to ETS (Environmental Tobacco Smoke). The present research is unique in that both short-term and

long-term exposures to ETS are considered. This is also the first study to examine the linkage between exposure to ETS and internalizing symptoms and externalizing behaviors among children, with control on parental socioeconomic status (SES), intrapersonal distress, problem behavior, and child-rearing factors.

ETS causes nearly 40,000 deaths each year, many of which are due to lung cancer and ischemic heart disease (Centers for Disease Control and Prevention, 2002). ETS also causes poor health outcomes in children (U.S. Department of Health and Human Services [USDHHS], 2004). Studies indicate that exposure to ETS during childhood has been associated with impaired lung function (USDHHS, 2001), asthma (Cook, Strachan, and Carey, 1999), and sudden infant death syndrome (USDHHS, 2004). Most of the literature on child exposure to ETS has concentrated on the effects of maternal smoking (Bauman, Flewelling, and La PELLE, 1991). The majority of studies have linked maternal smoking during pregnancy with behavioral disturbances in children (Brook, Brook, and Whiteman, 2000; Weitzman, Gortmaker, and Sobol, 1992). A growing body of literature has also looked at the effects of postnatal maternal smoking (Eskenazi and Castorina 1999; Williams et al., 1998). For example, Williams et al. (1998) estimated that maternal smoking in early pregnancy might account for 25% of externalizing (aggressive) behaviors, while maternal smoking when the child is 5 years old may account for an additional 16%. While much research on parental smoking focuses on maternal smoking, this study includes both maternal and paternal smoking.

As noted above, in examining the relationship of ETS and childhood aggression, we identified four psychosocial risk factors related to internalizing symptoms and externalizing behaviors in children. They include the following: (1) demographic factors such as SES, (2) parental problem behaviors (3) parental intrapersonal distress, and (4) parenting difficulties (Belsky, Woodworth, and Crnic, 1996; Jersild, Brook, and Brook, 1978).

There is an emerging body of research suggesting that parental low socioeconomic status (SES) is associated with smoking and offspring problem behaviors. Low SES has been associated with internalizing and externalizing problems among children (Escobedo, Anda, Smith, Remington, and Mast, 1990; Wagenknecht et al., 1990). Low SES also predicts smoking behavior in adults (Gilman, Abrams, and Buka, 2003). Therefore, we controlled for SES in our analyses.

With regard to internalizing symptoms in children, ETS and parental depression are important correlates (Marchand and Hock, 2003). Consequently, we examined the association between parental intrapersonal distress (e.g., depression) and children's internalizing symptoms. Since parental intrapersonal distress is also associated with parental smoking behavior (Kendler et al., 1993) as well as children's internalizing symptoms, parental intrapersonal distress was controlled in the analysis of children's internalizing symptoms.

Parental problem behaviors, such as parental deviance and crime, are major predictors of antisocial behavior in the next generation (Farrington, 2002). According to Farrington, Barnes, and Lambert (Farrington, Barnes, and Lambert, 1996), antisocial behavior is transmitted from one generation to the next. Although there are few studies looking at continuity across generations, the evidence with some exceptions suggests transgenerational continuity of this behavior. Based on the literature (e.g., Brook, Brook, Gordon, et al., 1990), we hypothesize that parental problem behavior is related to parental smoking behavior and their offspring's externalizing behaviors. Therefore, it is necessary to control for parental problem behavior in the analysis of parental smoking and child externalizing behaviors.

Parenting difficulty may also explain the relationship between parental smoking and internalizing symptoms and externalizing behaviors in their children. Adverse parenting has a negative impact on the child's development and behavior (Steinberg, 2000). As noted by McCord (McCord, 1991), low parental affection may influence how genetic or biological factors or social environmental factors are translated into antisocial behavior in children. Therefore, in this study, we controlled for parenting behavior (i.e., parental affection) in the analyses of children's internalizing symptoms and externalizing behaviors.

While there has been increasing research into the relationship between exposure to parental smoking and later behavior and health in childhood and adolescence, several features of their association merit further examination. First, research in this area has focused on the relationship between maternal smoking (especially during pregnancy) and offspring cognitive abilities, behaviors, and health problems (Brook, Brook, and Whiteman, 2000; Weitzman, Gortmaker, and Sobol, 1992; Williams et al., 1998). Little attention has been given to the potential adverse effects of paternal smoking. A second issue concerns the extent to which the association is direct. Several authors have found that there are likely to be a number of differences between smokers and nonsmokers with respect to socioeconomic status, personality, and child-rearing practices (Baker, Brandon, and Chassin, 2004). In contrast to much of the previous research, we control for these factors in order to reduce the chance of bias of the results. Third, studies in this area have focused on exposure to maternal smoking during one period (e.g., during pregnancy) and later behavior and health problems in childhood and adolescence. To address this gap we examine the probable effects of cumulative exposure to parental smoking over a long time span.

The primary aim of this paper is to determine whether there are adverse consequences to children from exposure to ETS from parental smoking. In contrast to research studies that focus solely on maternal smoking, especially during pregnancy, the present study examines the relation between children's chronic exposure to both maternal and paternal smoking and the children's behavior. The study also determines whether the association between parental smoking and their children's internalizing symptoms and externalizing behaviors is independent of such possible diverse confounding factors as SES, parental problem behaviors (e.g., intrapersonal distress and parental unconventional behaviors), and parental affection towards the child. Also in contrast to other studies, this study examines this association over a long time span. More specifically, we examine whether there are cumulative adverse effects of exposure to parental smoking over time on children's internalizing symptoms and externalizing behaviors, as opposed to the effects of exposure to parental smoking for one period of time.

## Method

### Sample and Procedure

The parent participants were drawn from our longitudinal study entitled "Childhood Etiologic Determinants of Adolescent Drug Use." Participant data were based on a randomly selected cohort (N = 975) at T1 studied prospectively since 1975. The families in this study were generally representative of the population of families in Albany and Saratoga, two upstate New York counties, in 1975 with respect to ethnicity, gender, family intactness, family income, and education (Cohen and Cohen, 1983). Moreover, there was a close match of the participants on family income, maternal education, and family structure with the 1980 survey conducted by the U.S. Bureau of Census. Follow-up data were collected in their homes in 1983 (T2), 1985–86 (T3), 1992 (T4), 1997 (T5), and 2002 (T6). The mean ages (SDs) of the participants at the follow-up interviews were: 14.05 (2.80), 16.26 (2.81), 22.28 (2.82), 26.99 (2.80), and 32.00 (2.84). Seventy-five percent of the children lived with married parents, and 19% lived with a mother who was not currently married; the 1980

census figures were 79% and 17%, respectively. The parent participants (N=230) who had offspring between the ages of 4 and 15 were asked questions about their offspring's behavior at T6. The parents who participated at T6 did not differ from the remainder of the original sample with regard to the baseline prevalence of behavioral and emotional problems. The participants consisted of 68.7% mothers and 31.3% fathers. The mean age (SD) of the parents when their offspring was born was 24.00 (4.03) years. The mean family annual income at T6 was \$27,000. The parents at T6 had a total of 230 offspring (56.5% females and 43.5% males) aged 4–15 (Mean age =8.61, SD=3.11). Eighty-six percent of their offspring were white and 12% were black. The interviews were administered by extensively trained and supervised lay interviewers. The interviews took approximately 1 ½ hours. Written informed consent was obtained from the participants. Approval for the participation of human subjects was granted by the Institutional Review Board of the New York University School of Medicine. In addition, a Certificate of Confidentiality from the National Institute of Health was obtained for all data collections. Additional information regarding the study's methodology is available from previous reports (Cohen and Cohen, 1996).

## Measures

**Child Behavior problems**—Child behavior problems were measured in 2002–2003 (T6) using items from the Child Behavior Checklist (CBCL) of Achenbach (1991). The CBCL is a parental rating scale for assessing behavioral and emotional problems in the 4–18 year-old age group. The validity of the CBCL internalizing/externalizing scales has been supported by a wide variety of studies (Achenbach, 1991; Achenbach, 1992). The internalizing scale consists of 31 items with a Cronbach's alpha of 0.85 and comprises withdrawn, somatic complaints, and depressive/anxious syndrome scales. The externalizing scale consists of 32 items with a Cronbach's alpha of 0.88 and comprises delinquent and aggressive behavior syndrome scales.

Each behavioral item was graded on a three-point scale (0 = not true, 1 = somewhat or sometimes true, and 2 = very true or often true). The items were totaled to arrive at scores for each of the two scales. In addition, five subscales were also created. These subscales were withdrawn behaviors (Cronbach's alpha = 0.71), somatic complaints (Cronbach's alpha = 0.67), depressive/anxious behaviors (Cronbach's alpha = 0.79), delinquent behaviors (Cronbach's alpha = 0.62), and aggressive behaviors (Cronbach's alpha = 0.87).

**Exposure to Parental Cigarette Smoking**—Parental cigarette smoking was assessed at each wave of data collection beginning at T2. Participants were asked about the frequency of their cigarette use since the last wave of data collection. For each wave of data collection, the frequency of cigarette smoking during that wave was rated as never smoked (0), did not smoke during that wave of data collection (1), some but less than daily smoking during that wave (2), 1–5 cigarettes a day during that wave (3), about half a pack a day during that wave (4), about a pack a day during that wave (5), and about 1.5 packs a day or more during that wave (6). During waves T3-T4, T4-T5, and T5-T6, the percentage of parents who smoked at least 1–5 cigarettes a day or more was 42.6%, 40.0%, and 36.1% respectively. Throughout the three time periods, 28.7% of the parents smoked at least 1–5 cigarettes a day. We then formed a continuous composite index by multiplying the age of the child at the time of the parent's interview by the mean score of parental cigarette smoking from T3-T4, T4-T5, and T5-T6 (for children 10–15 years of age), from T4-T5 and T5-T6 (for children 6–9 years of age), and from T5-T6 (for children 4–5 years of age). For example, if a child's age at T6 was 12 years, and the parental scores were 3 at wave T3-T4, 4 at wave T4-T5, and 2 at wave T5-T6, then the composite index would be  $12 \times 3$  (3 being the mean of 3, 4, and 2), which

equals 36. This composite index (mean for all subjects = 19.98, SD = 21.68) measures both longevity and intensity of the exposure of the child to parental cigarette smoking.

**Other Independent Variables**—We took into account the respondents' relevant demographic background, which consisted of parental gender, parental age at child's birth, child's gender, and child's age at interview, and a combined measure of parental income and parental educational level at T6 as a proxy for parental socioeconomic status (SES). In deriving the SES measure, we standardized both parental education and income prior to combining them. As noted above, SES at T6 was deemed to be a more valid measure of the individual's SES status. The parent's smoking behavior (continuous versus non-continuous daily smoking) through the three time periods (T4-T6) was also considered.

In the parental personality domain, we included parental intrapersonal distress, which consisted of symptom scales assessing depression, anxiety, and obsessive thinking, and parental unconventionality, which consisted of scales assessing rebellion and delinquency. For each scale, we created a composite index by adding the scores assessing parental personality from T4 to T6. Table 1 presents sample questions, Cronbach's alphas, and reference sources for each subscale.

In assessing the parental child-rearing domain at T6, we included affection towards the child. Parental affection was measured by asking the parents to describe the way they act with their child, such as showing their love for their child, praising their child, hugging and kissing their child goodnight, and telling their child he/she makes them happy. Each item was rated on a five-point scale (1 = not at all, 2 = very little, 3 = somewhat, 4 = very much, and 5 = exactly). The Cronbach's alpha for the scale assessing parental affection towards their child was 0.78. Both the parental measure of affection and measures in the parent personality domain have been found to predict delinquency, drug use, and psychopathology in offspring (Cohen and Cohen, 1996).

To clarify the relative effects of the independent variables, we standardized each dependent and continuous independent variable.

## Analyses

OLS linear regression analyses were conducted to examine the relationship between exposure to parental cigarette smoking and childhood internalizing symptoms and externalizing behaviors. Interaction analyses were conducted in order to examine parental and child gender differences in the relationship between exposure to parental smoking and offspring internalizing symptoms and externalizing behaviors. No significant interaction effects were found, indicating that exposure to maternal and paternal cigarette smoking had equal effects on both male and female children's behavior problems. Therefore, we conducted the analyses on the combined sample. The analyses of parental smoking and the offspring's behavior controlled for parental personality (intrapersonal distress and unconventionality), parental child-rearing (affection towards child), parental smoking (continuous versus non-continuous daily smoking during T3-T4, T4-T5, and T5-T6), and demographic variables (parent gender, parent age at child's birth, child's gender, child's age, and parental SES).

## Results

Tables 2 and 3 present the results (i.e., standardized coefficients and standard errors) for internalizing symptoms and externalizing behaviors, respectively.



The results indicate that the children's internalizing symptoms and externalizing behaviors were significantly related to parental cigarette smoking. The magnitude of the associations were comparable for internalizing symptoms and externalizing behaviors. In particular, internalizing symptoms and externalizing behaviors would increase about 0.31 and 0.29 standard deviations, respectively, as a result of one standard deviation increase in the exposure to parental smoking. The effects of exposure to parental cigarette smoking were independent of demographic factors, parental intrapersonal distress, as well as parental affection.

The results also indicate that children's internalizing symptoms were significantly associated with parental intrapersonal distress, with control on exposure to parental smoking. Children's externalizing behavior problems were significantly associated with parental unconventionality, with control on exposure to parental smoking, SES, and affection.

## Discussion

Exposure to parental cigarette smoking increased the likelihood for their children to develop both internalizing symptoms and externalizing behaviors. This relationship was maintained despite control on a number of parental psychosocial risk factors that have previously been found to be associated with children's behavior problems. These psychosocial factors include demographic variables (parental gender and age at child's birth; child gender and age; and a combined measure of parental income and educational level as a proxy for parental SES), parental intrapersonal attributes (i.e., depression or unconventionality), and parental child-rearing practices (i.e., affection toward child).

The present results are in accord with previous research, which has demonstrated that exposure to parental cigarette smoking is related to increased rates of behavior problems in the child (Eskenazi and Castorina, 1999). However, our research is the first to show that the history of exposure to parental smoking is linked with both internalizing and externalizing behavior in the child. The findings of the present study also extend the findings of previous research, first by examining the effects of exposure to parental cigarette smoking while controlling for important psychosocial factors known to be associated with childhood behavior problems, and second, by using a community-based sample. Thus, the influence of exposure to parental smoking on offspring behavior problems cannot be explained by these other parental risk factors. One possible mechanism through which exposure to parental cigarette smoking influences children's internalizing symptoms and externalizing behaviors is by affecting the neural structure and neurobiological functioning in the brain of the offspring which, in turn, affects behaviors in the youngster. Another possible mechanism has to do with modeling behavior problems associated with parents who smoke cigarettes.

The findings indicated that in addition to exposure to parental smoking, there are three major types of parental risk factors that are related to internalizing symptoms or externalizing behaviors in the child: low SES, intrapersonal distress (e.g., depression), and unconventional behavior. These findings are in accord with those of others (Conger, Ge, Elder, Lorenz, and Simons, 1994; Conger, Neppl, Kim, and Scaramella, 2003).

This study extends the findings of previous investigators in demonstrating the independence of these risk factors, thereby showing that the child's behavior problems are vulnerable to three distinct types of risks in addition to exposure to parental smoking. The implication is that interventional procedures need to focus separately on the alleviation of exposure to parental smoking and the three distinct risk factors identified in this study. As noted earlier, the effects of exposure to maternal or paternal cigarette smoking are not significantly

different. The implication is that interventional procedures need to focus on smoking by mothers as well as by fathers.

As hypothesized, parental SES was negatively related to externalizing behaviors in children. These findings are consistent with the literature which documents the negative physical and mental health outcomes as one moves lower on the SES gradient (Chen, Matthews, and Boyce, 2002). One possible mechanism is that lower SES precipitates marital and parent-child conflict resulting in internalizing and externalizing symptoms in children (Conger et al., 1994). However, parental SES was only related to internalizing behavior prior to adjusting for the control variables. With control on parental SES, exposure to parental smoking was still linked with internalizing symptoms and externalizing behaviors in the youngster.

Parental intrapersonal distress was related to internalizing behavior in the offspring. Among the various factors that might account for this relationship are genetic vulnerabilities, disruptions in the prenatal environment, conflictual parent-child interactions, and contextual risk factors such as high levels of stress within the family (Dawson et al., 2003). Our findings extend previous research by demonstrating that intrapersonal distress is related to internalizing behavior despite control on exposure to parental smoking, family income, and parental affection.

The results also suggest that parental problem behavior was related to externalizing behaviors in the offspring. During childhood, parents shape their children's behavior both through their behavioral examples and through parenting practices. In the literature, this association is typically explained by the effects of poor parenting, rather than by representing a direct association in problem behavior across generations (Conger et al., 2003). Our findings add to the literature by confirming that parental unconventional problem behavior is related to offspring externalizing behaviors despite control on exposure to parental smoking, family income, and parental affection.

Parental affection was inversely related to both internalizing symptoms and externalizing behaviors in their offspring. Our results are consistent with those of other researchers who have noted that inadequate emotional nurturance is associated with poor mental health. Lack of warmth, cohesiveness and acceptance of children are associated with internalizing symptoms such as depression and anxiety disorders (Chorpita and Barlowe, 1998), and with externalizing symptoms such as aggressive and delinquent behavior (Barber, 1996). However, with control on parental SES, intrapersonal distress, and unconventional behavior, parental affection was no longer related to internalizing symptoms or externalizing behaviors. This finding is difficult to explain.

The findings of the present study warrant some qualifications. First, the data on parental smoking were based on parental reports. In addition to parental self-reports of smoking behavior in future studies, direct physiological measures of parental smoking would be beneficial. Second, we did not control for parental smoking during pregnancy when examining the linkage between exposure to smoking and internalizing symptoms and externalizing behaviors. However, we did control for continuous smoking during the three time periods evaluated. To the extent that continuous smoking is related to prenatal smoking, we do have a partial control. Nevertheless, we assume that both prenatal and postnatal smoking, as well as the combination of these two factors, predicts internalizing symptoms and externalizing behaviors in children. We also did not control for sibling smoking or smoking by others in the household that would contribute to these behaviors.

Despite these limitations, the findings from the present study indicate that there are two major types of parental risk factors that are related to behavior problems in the child,

namely, exposure to parental cigarette smoking, and parental behaviors (intrapersonal distress or unconventional behaviors). Furthermore, this study extends previous results in demonstrating the independence of parental smoking as well as the other risk factors, thereby showing that the child's behavior problems are sensitive to several types of risks. The implication is that interventions need to focus separately on the alleviation of parental smoking and the other distinct risk factors. As noted earlier, the effects of exposure to maternal and paternal cigarette smoking are not significantly different. The implication is that interventional procedures need to focus on mothers as well as fathers. Another suggestion is that interventions focus increasingly on promoting home-based voluntary restrictions on smoking to reduce exposure to ETS.

Our study highlights the important adverse consequences to children from chronic exposure to the cigarette smoking of their parents. A reduction in parental smoking may lead to decreased behavior problems among their offspring.

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## References

- Achenbach, TM. Manual for the Child Behavior Checklist/4-18 and 1991 Profile. Burlington, VT: University of Vermont Department of Psychiatry; 1991.
- Achenbach, TM. Manual for the Child Behavior Checklist/2-3 and 1992 Profile. Burlington, VT: University of Vermont Department of Psychiatry; 1992.
- Baker TB, Brandon TH, Chassin L. Motivational influences on cigarette smoking. *Annual Review of Psychology*. 2004; 55:463–491.
- Barber BK. Parental psychological control: revisiting a neglected construct. *Child Development*. 1996; 67:3296–3319. [PubMed: 9071782]
- Bauman KE, Flewelling RL, La Prelle J. Parental cigarette smoking and cognitive performance of children. *Health Psychology*. 1991; 10:282–288. [PubMed: 1915215]
- Belsky J, Woodworth S, Crnic K. Trouble in the second year: Three questions about family interaction. *Child Development*. 1996; 67:556–578. [PubMed: 8625728]
- Brook JS, Brook DW, Gordon AS, et al. The psychosocial etiology of adolescent drug use: A family interactional approach. *Genetic, Social, and General Psychology Monographs*. 1990; 116:111–267.
- Brook JS, Brook DW, Whiteman M. The influence of maternal smoking during pregnancy on the toddler's negativity. *Archives of Pediatrics and Adolescent Medicine*. 2000; 154:381–385. [PubMed: 10768677]
- Brook JS, Richter L, Rubenstone E. Consequences of adolescent drug use on psychiatric disorders in early adulthood. *Annual Review of Medicine*. 2000; 32:401–407.
- Brook JS, Whiteman M, Finch S, Cohen P. Young adult drug use and delinquency: Childhood antecedents and adolescent mediators. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1996; 35:1584–1592. [PubMed: 8973064]
- Centers for Disease Control and Prevention. [homepage on the internet]. Exposure to environmental tobacco smoke and cotinine levels [fact sheet]. 2002. Retrieved May 16, 2006 from: [http://www.cdc.gov/Tobacco/research\\_data/environmental/factsheet\\_ets.htm](http://www.cdc.gov/Tobacco/research_data/environmental/factsheet_ets.htm)
- Chen E, Matthews KA, Boyce WT. Socioeconomic differences in children's health: How and why do these relationships change with age? *Psychological Bulletin*. 2002; 128:295–329. [PubMed: 11931521]
- Chorpita BF, Barlowe DH. The development of anxiety: The role of control in the early environment. *Psychological Bulletin*. 1998; 124:3–21. [PubMed: 9670819]



- Cohen, J.; Cohen, P. Applied multiple regression/correlation analysis for the behavioral sciences. 2. Hillsdale, NJ: Erlbaum Associates; 1983.
- Cohen, P.; Cohen, J. Life values and adolescent mental health. Mahwah, NJ: Lawrence Erlbaum Associates; 1996.
- Conger RD, Ge X, Elder G, Lorenz FO, Simons RL. Economic stress, coercive family process, and developmental problems of adolescents. *Child Development*. 1994; 65:541–561. [PubMed: 8013239]
- Conger RD, Nepl T, Kim KJ, Scaramella L. Angry and aggressive behavior across three generations: A prospective, longitudinal study of parents and children. *Journal of Abnormal Child Psychology*. 2003; 31:143–160. [PubMed: 12735397]
- Cook DG, Strachan DP, Carey IM. Health effects of passive smoking. *Thorax*. 1999; 54:469. [PubMed: 10409072]
- Dawson G, Ashman SB, Panagiotides H, Hessel D, Self J, Yamada E, Embry L. Preschool outcomes of children of depressed mothers: Role of maternal behavior, contextual risk, and children's brain activity. *Child Development*. 2003; 74:1158–1175. [PubMed: 12938711]
- Derogatis LR, Lipman RS, Rickels K, et al. The Hopkins Symptoms Checklist (HSCL): A self-report symptom inventory. *Behavioral Science*. 1974; 19:1–15. [PubMed: 4808738]
- Escobedo LG, Anda RF, Smith PF, Remington PL, Mast EE. Sociodemographic characteristics of cigarette smoking initiation in the United States: Implications for smoking prevention policy. *JAMA*. 1990; 264:1550–1555. [PubMed: 2395195]
- Eskenazi B, Castorina R. Association of prenatal maternal or postnatal child environmental tobacco smoke exposure and neurodevelopmental and behavioral problems in children. *Environmental Health Perspectives*. 1999; 107:991–1000. [PubMed: 10585903]
- Farrington DP, Barnes GC, Lambert S. The concentration of offending in families. *Legal and Criminological Psychology*. 1996; 1:47–63.
- Farrington, DP. Families and crime. In: Wilson, JQ.; Petersilia, J., editors. *Crime: Public policies for crime control*. Oakland, CA: Institute for Contemporary Studies Press; 2002. p. 129-148.
- Gilman SE, Abrams DB, Buka SL. Socioeconomic status over the life course and stages of cigarette use: Initiation, regular use, and cessation. *Journal of Epidemiology and Community Health*. 2003; 57:802–808. [PubMed: 14573586]
- Gold M. Undetected delinquent behavior. *Journal of Research in Crime and Delinquency*. 3:27, 46.
- Jersild, AT.; Brook, JS.; Brook, DW. *The psychology of adolescence*. New York: Macmillan; 1978.
- Kendler KS, Neale MC, MacLean CJ, Heath AC, Eaves LJ, Kessler RC. Smoking and major depression: A causal analysis. *Archives of General Psychiatry*. 1993; 50:36–43. [PubMed: 8422220]
- Marchand JF, Hock E. Mothers' and fathers' depressive symptoms and conflict resolution strategies in the marriage and children's externalizing and internalizing behaviors. *Journal of Genetic Psychology*. 2003; 164:227–239. [PubMed: 12856817]
- McCord J. The cycle of crime and socialization practices. *Journal of Criminal Law and Criminology*. 1991; 82:211–228.
- Rose SL, Rose SA, Feldman JF. Stability of behavior problems in very young children. *Developmental Psychopathology*. 1989; 1:5–19.
- Schaefer ES. Children's report of parental behavior: An inventory. *Child Development*. 1965; 36:413–424. [PubMed: 14300862]
- Smith, GM.; Fogg, CP. Psychological antecedents of teenage drug use. In: Simmons, R., editor. *Research in community and mental health: an annual compilation of research*. Vol. 1. Greenwich, CT: JAI; 1979. p. 87-102.
- Steinberg L. We know some things: parent-adolescent relations in retrospect and prospect. *Journal of Research on Adolescence*. 2000; 10:83–110.
- U.S. Department of Health and Human Services. *The health consequences of smoking. A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease and Health Prevention and Health Promotion, Office on Smoking and Health; 2004.

- U.S. Department of Health and Human Services. Women and smoking. A report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease and Health Prevention and Health Promotion, Office on Smoking and Health; 2001.
- Wagenknecht LE, Perkins LL, Cutter GR, Sidney S, Burke GL, Manolio TA, et al. Cigarette smoking behavior is strongly related to educational status: The CARDIA study. *Preventive Medicine*. 1990; 19:158–169. [PubMed: 2193307]
- Weitzman M, Gortmaker S, Sobol A. Maternal smoking and behavior problems of children. *Pediatrics*. 1992; 90:342–349. [PubMed: 1518686]
- Williams GM, O’Callaghan M, Najman JM, Bor W, Andersen MJ, et al. Maternal cigarette smoking and child psychiatric morbidity: A longitudinal study. *Pediatrics*. 1998; 102:1–8. [PubMed: 9651405]

**Table 1**

Cronbach Alphas for Sub-Scales of Dimensions of Intrapersonal Distress, Unconventionality, and Child Rearing

Scale	Cronbach Alpha	Sample Question and Source
Intrapersonal Distress		
Depression	0.82	Over the past few years, how much were you bothered by feeling low in energy or slowed down? [30]
Anxiety	0.74	Over the past few years, how much were you bothered by feeling nervous or shaky inside? [30]
Obsession	0.68	Over the past few years, how much were you bothered by blaming yourself for things? [30]
Unconventionality		
Rebellion	0.72	When rules and regulations get in the way, you sometimes ignore them. [31]
Delinquency	0.72	How often have you gotten into a serious fight at school or work? [32]
Child Rearing		
Affection	0.78	How often do you show love for your child? [33]

**Table 2**  
OLS Regression of Childhood/Adolescence Internalizing Behaviors on Exposure to Parental Smoking (N=230)

Independent Variables	Withdrawn/Depressive/Anxious Behaviors		Somatic Complaints		Internalizing Behaviors	
	Before Adjusting Coefficient (s.e.)	After Adjusting <sup>a</sup> Coefficient (s.e.)	Before Adjusting Coefficient (s.e.)	After Adjusting <sup>a</sup> Coefficient (s.e.)	Before Adjusting Coefficient (s.e.)	After Adjusting <sup>a</sup> Coefficient (s.e.)
Exposure to Parental Smoking	0.21(0.06)**	0.27(0.11)*	0.27(0.06)***	0.26(0.12)*	0.25(0.06)***	0.31(0.11)***
Socioeconomic Status Parental SES	-0.19(0.07)**	-0.10(0.07)	-0.05(0.07)	0.10(0.07)	-0.17(0.07)**	-0.05(0.07)
Parental Personality Intrapersonal distress	0.40(0.06)***	0.34(0.06)***	0.28(0.06)***	.27(0.07)***	0.42(0.06)***	0.37(0.06)***
Parental Childrearing Affection toward child	-0.14(0.07)*	-0.08(0.06)	-0.08(0.07)	-0.01(0.07)	-0.14(0.07)*	-0.07(0.06)

\* p<0.05,

\*\*

p<0.01,

\*\*\*

p<0.001

<sup>a</sup>Regression coefficient was adjusted when the full model was conducted. The independent variables were exposure to parental smoking, parental smoking habit, parent gender, parent age at child's birth, child gender, child age, parental SES, parental unconventionality, and parental affection toward child.

**Table 3**  
OLS Regression of Childhood/Adolescence Externalizing behaviors on Exposure to Parental Smoking (N=230)

Independent Variables	Delinquent Behaviors		Aggressive Behaviors		Externalizing behaviors	
	Before Adjusting Coefficient (s.e.)	After Adjusting <sup>d</sup> Coefficient (s.e.)	Before Adjusting Coefficient (s.e.)	After Adjusting <sup>d</sup> Coefficient (s.e.)	Before Adjusting Coefficient (s.e.)	After Adjusting <sup>d</sup> Coefficient (s.e.)
Exposure to Parental Smoking	0.21(0.06)**	0.27(0.12)*	0.25(0.06)***	0.27(0.12)*	0.26(0.06)***	0.29(0.12)*
Socioeconomic Status Parental SES	-0.22(0.06)***	-0.16(0.07)*	-0.25(0.06)**	-0.16(0.07)*	-0.26(0.06)***	-0.17(0.07)*
Parental Personality Unconventionality	0.18(0.07)**	0.18(0.07)*	0.25(0.06)***	0.19(0.07)**	0.25(0.06)***	0.20(0.07)**
Parent Childrearing Affection toward child	-0.03(0.07)	0.02(0.07)	-0.19(0.07)**	-0.12(0.07)	-0.16(0.07)*	-0.10(0.07)

\* p<0.05,

\*\* p<0.01,

\*\*\* p<0.001

<sup>d</sup>Regression coefficient was adjusted when the full model was conducted. The independent variables were exposure to parental smoking, parental smoking habit, parent gender, parental age at child's birth, child gender, child age, parental SES, parental unconventionality, and parental affection toward child.