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Parental occupation, education, and smoking as predictors of offspring tobacco use in adulthood: A longitudinal study

Pebbles Fagan[a], Judith S. Brook[b,*], Elizabeth Rubenstone[b], Chenshu Zhang[b]

[a]*Tobacco Control Research Branch, National Cancer Institute, Bethesda, MD, USA*
[b]*New York University School of Medicine, 215 Lexington Avenue, 15th Floor, New York, NY 10016, USA*

Abstract

This study examined the interrelation of parental occupational status (blue- versus white-collar), parental education, parental smoking, parent–child relations, late adolescent tobacco use, and adult offspring smoking. A longitudinal data set was employed, composed of 603 participants who were first studied in childhood and then followed to mean age 27 years. Structural Equation Modeling (SEM) showed that the distal factors of parental blue-collar status, low parental educational achievement, and parental smoking were related to adult offspring smoking. Specifically, parental blue-collar status and parental smoking were mediated by the latent construct of the parent–child relationship, which in turn was mediated by smoking in late adolescence with respect to adult offspring smoking. Parental educational level was partially mediated by the parent–adolescent relationship but also had a direct path to adult offspring smoking. The most powerful predictor of offspring smoking in adulthood was smoking in late adolescence. Findings imply areas that may be targeted by intervention programs to decrease offspring tobacco use.

Keywords: Blue-collar smoking; SES and smoking; Offspring smoking; Parental education; Parental occupation

1. Introduction

The vast majority of adolescents who smoke will continue to smoke into adulthood (Chassin, Presson, Rose & Sherman, 1996; Moolchan, Ernst, & Henningfield, 2000). According to the Surgeon General, one in three adolescents who begin smoking will transition to regular use

* Corresponding author. Tel.: +1 212 263 4662; fax: +1 212 263 4657.
E-mail address: judith.brook@med.nyu.edu (J.S. Brook).

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(U.S. Department of Health and Human Services, 1994); many will die or experience high rates of morbidity as a result (CDC, 2003; Ezzati & Lopez, 2003; Peto, Lopez, Boreham, Thun, & Heath, 1994; Skurnik & Shoenfeld, 1998), and those who begin smoking earlier may be at greater risk for lung cancer (USDHHS, 1990).

Several investigations have found an inverse relationship between parental socioeconomic status (SES) and tobacco use in their adolescent and adult offspring (Chen, Matthews, & Boyce, 2002; Conrad, Flay, & Hill, 1992; Harrell, Bangdiwala, Deng, Webb, & Bradley, 1998; Jefferis, Graham, Manor & Power, 2003; Turrell, Battistutta, & McGuffog, 2002; Tyas & Pederson, 1998). However, few studies to date have examined the specific components of parental SES as related to tobacco use in their offspring in adulthood. In the present study, we focused on two such components, namely, parental educational attainment and parental occupational status ("blue-collar" vs. "white-collar"). Our study provides a unique opportunity to examine the relation of these components of parental SES, as well as parental smoking, with smoking in their offspring, whom we have followed from childhood through the late 20s.

Our research examined the specific pathways that lead from parental educational attainment and parental occupational status (blue- vs. white-collar) during their offspring's childhood to the latter's smoking in adulthood. More specifically, we hypothesized that the parent–child relationship would serve as one of the principle mechanisms intervening between parental educational level and parental occupational status and their adult offspring's tobacco use. We also proposed to examine the differential relationships, if any, that these two factors (parental education and occupation) might have with the parent–child relationship as well as with offspring smoking.

2. Parental education and occupational status and offspring tobacco use

Fig. 1 provides an overview of the conceptual model that guided this research. Based on a family interactional perspective (Brook, Brook, Gordon, Whiteman, & Cohen, 1990), the

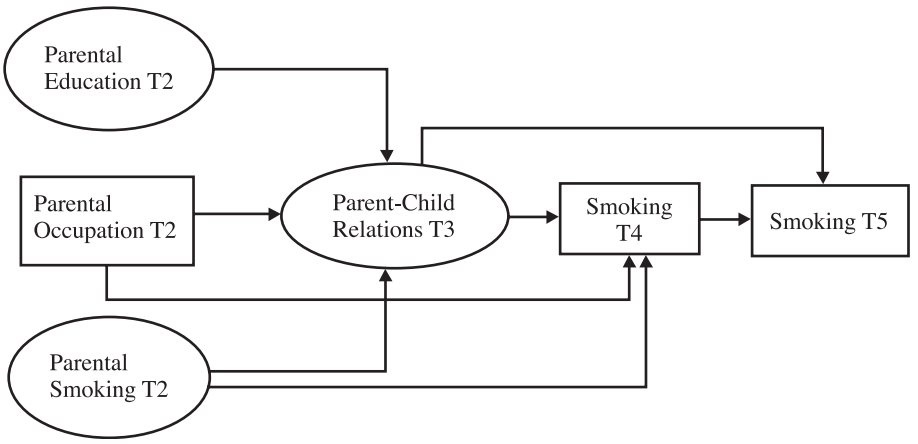

Fig. 1. Hypothesized model predicting offspring smoking in the late 20s (T5) from parental education, occupation, smoking, and child-rearing variables.

model begins with the constructs of parental educational attainment, parental blue-collar versus white-collar occupational status, and parental smoking.

According to our model and based on the empirical literature (Chassin, Presson, Sherman, & Edwards, 1992; Soteriades & DiFranza, 2003; Voorhees, Schreiber, Schumann, Biro, & Crawford, 2002), we hypothesized that both lower parental educational level and blue-collar parental occupational status would predict increased smoking behavior in their adult offspring (Gilman, Abrams & Buka, 2003; Huurre, Aro, & Rahkonen, 2003; White, Pandina, & Chen, 2002).

3. Child-rearing as mediating the link between distal parental variables and adult offspring smoking

Also as noted in Fig. 1, we hypothesized that a weak parent–child bond would be a critical mediator between parental education and parental occupation and adult offspring tobacco use. The parent–child construct consists of several, interrelated dimensions of parental behavior known to have an influence on adolescent development, including tobacco use. These factors comprise: (a) a weak parent–child bond that includes low identification with the parent by the child (Brook, Kessler, & Cohen, 1999; Doherty & Allen, 1994; Fleming, Kim, Harachi, & Catalano, 2002); (b) parent–child conflict, including limited warmth and affection (Conger, Ge, Elder, Lorenz, & Simons, 1994; Flay, Hu, & Richardson, 1998; O'Byrne, Haddock, & Poston, 2002); and (c) low parental educational expectations and aspirations for the child (Bandura, Barbaranelli, Caprara, & Pastorel, 2001; Resnick et al., 1997). These child-rearing dimensions have been found to be related to adolescent smoking in the prior research of other investigators as well as in our own previous studies (Brook,Whiteman, Czeisler, Shapiro, Cohen, 1997; Doherty & Allen, 1994; Duncan, Duncan, Biglan, & Ary, 1998).

Some research suggests that parents with low educational levels and those in blue-collar occupations are more likely to have a weak parent–child bond (Mistry, Vandewater, Huston, & McLoyd, 2002; Wills, McNamara, & Vaccaro, 1995). Based on these findings, we hypothesized that low parental educational attainment and parental blue-collar status (i.e., skilled, semiskilled, or unskilled workers) would relate to adversity in the parent–child relationship which, in turn, would be associated with greater smoking in adult offspring.

4. Parental smoking

Smoking tends to run in families (Chassin, Presson, Rose, & Sherman, 1998; Kardia, Pomerleau, Rozek, & Marks, 2002; Wickrama, Conger, Wallace, & Elder, 1999). Thus, we hypothesized a pathway between parental and offspring smoking, as noted in Fig. 1. There are two likely mechanisms by which parental smoking relates to their offspring's smoking behavior. First, biological factors, such as a genetic diathesis or intrauterine exposure to nicotine, may increase the risk for tobacco use among the offspring of smokers (Flay & Petraitis, 2003; Hellstrom-Lindahl & Nordberg, 2002). In addition, the offspring of mothers who are heavy smokers are more likely to become nicotine dependent than the offspring of

nonsmokers (Buka, Shenassa & Niaura, 2003). Second, the transmission from parent to child may be based on parental drug modeling (Brook, Brook, Richter, & Whiteman, 2003) in which adolescents imitate their parents' drug use behavior (Chassin et al., 1998; Pedersen & Lavik, 1991; Stanton et al., 2002).

5. Continuity of smoking from late adolescence to adulthood (the late 20s)

Research has demonstrated that smoking in adolescence predicts smoking during the early and late 20s (Chassin, Presson, Sherman, & Edwards, 1990; Mayhew, Flay, & Mott, 2000). Both psychological and biological factors appear to influence the maintenance of smoking over time (Moolchan et al, 2000). Psychological factors include smoking for pleasure, smoking from habit, and smoking as a form of self-medication to alleviate or ward off intrapersonal distress (Chabrol et al., 2000).

The present investigation was designed to test the adequacy of our model of parental educational attainment, parental (blue- vs. white-collar) occupational status, parental tobacco use, parent–child relations, late adolescent smoking, and adult offspring tobacco use. The current study addressed this issue in a longitudinal, community-based sample of children first assessed during childhood and then followed into adulthood. This research extends previous investigations by tracing the direct and indirect associations through which the two components of parental SES (educational level and occupational status), parental smoking, parent–child relations, and late adolescent tobacco use are related to offspring smoking in adulthood. Moreover, our study uses a multiple-informant design (i.e., mother and child) which, to some extent, corrects biases that may adhere to single-informant responses.

6. Method

6.1. Sample and measures

The sample consisted of 603 participants first studied in 1975 at Time 1 (T1). The parental measures were assessed at T1 and again at T2 (1983). The parent–child relationship variables were measured at T3 (1986), late adolescent smoking was assessed at T4 (1992), and adult offspring smoking (in the late 20s) was obtained at T5 (1997). The mean ages of offspring participants were 14.5 years (S.D.=2.80) at T2, 16.7 years (S.D.=2.80) at T3, 22.0 years (S.D.=2.80) at T4, and 27.0 (S.D.=2.80) at T5. For this analysis, the sample consisted of 756, 739, 750, 749, and 603 participants, respectively, at each time point. Because the comparison between blue- and white-collar occupational status was a major focus of this study, the families that did not belong to either occupational category (e.g., unemployed) were excluded from the analysis. The families that did not participate in all of the follow-up interviews were also excluded. Consequently, the analysis included a total of 603 participants who were interviewed at each point in time from T1 through T5. (For a more complete description of sampling procedures, see Cohen & Cohen, 1996.) Based on T2 data

(used in the analysis), we compared the 603 participants with the 153 participants who were excluded because they did not meet the preceding criteria. There were no significant differences between the groups in terms of gender (chi square=1.66, $p>0.10$) nor tobacco use at T5 ($t=0.17$, $p>0.10$). Of the participants, 51.6% were females, 94.2% had an educational level of 12th grade or higher, and 60.7% belonged to the white-collar occupational class (e.g., office worker, technician, administrator, manager, and executive) at T5. At T2, 86.7% and 81.7% of the children's mothers and fathers, respectively, had an educational level of 12th grade or higher; 77.5% of the youth were reared in a white-collar family (mother and/or father belonged to the white-collar occupational class). Informed consent was obtained from participants at each time wave.

6.2. Measures

6.2.1. Tobacco use at Time 5 (T5)

Questions about offspring tobacco use were included at several waves of data collection (T2–T5). A measure of smoking during the past 5 years, assessed at T5, was the dependent variable in the current study. The response options and respondent percentages were as follows: never smoked (36.6%), none (10.6%), less than daily (18.2%), 1–5 cigarettes a day (5.5%), about half a pack a day (11.4%), about a pack a day (15.3%), and about 1.5 packs a day or more (2.3%). The mean smoking score at T5 was 2.0 (S.D.=1.95), which corresponds to some tobacco use, but slightly less frequent than daily use.

6.2.2. Tobacco use at Time 4 (T4)

A measure of smoking during the past 5 years (between T3 and T4) was used as one of the predictor variables (late adolescent smoking). The variable had a scale with the same response range as at T5. The options and respondent percentages for T4 smoking were as follows: never (38.5%), none (7.1%), less than daily (18.6%), 1–5 cigarettes a day (6.8%), about half a pack a day (13.9%), about a pack a day (11.1%), and about 1.5 packs a day or more (3.5%). The mean score at T4 was 1.98 (S.D.=1.96), which indicates that average tobacco use was slightly less frequent than daily use. The test–retest reliability of the smoking variable was supported by the correlation between offspring smoking at T4 and T5 ($r=.80$; $p<0.001$).

6.2.3. Parent–child relations at Time 3 (T3)

The interview at Time 3 (T3) consisted of eight widely used scales assessing parent–child relations. The measures have been found to predict drug use, delinquency, and psychopathology in adolescents (Brook, Whiteman, Balka, Win, & Gursen, 1997; Johnson, Boney, & Brown, 1990–91; Johnson & Pandina, 1991). The scales comprising the parent–child relationship latent variable included the following: maternal identification, maternal encouragement of ideas, resistance to maternal control, maternal satisfaction with child, maternal expectation of child's schooling, maternal aspiration for child's schooling, paternal identification, and resistance to paternal control. The Cronbach's alphas for these measures were all satisfactory (see Table 1), and the intercorrelations of these scales were all significant ($p<0.05$).

Table 1
Parental child-rearing variables, sources, and Cronbach's alphas

Scale (number of items)	Sample question (source)	Cronbach's alpha
Maternal identification (14)[a]	How much do you admire your mother in her role as a parent? (Original)	0.92
Maternal encouragement of child's ideas (3)	Your child is always free to tell you what he/she thinks. (Schaefer, Edgerton, & Comstock, 1976)	0.56
Child's resistance to maternal control (6)	Your child often breaks your rules. (Schaefer & Finkelstein, 1975)	0.90
Maternal satisfaction with child (8)	I am satisfied with my child's overall accomplishments. (Original)	0.80
Maternal expectation for child's education (1)	How far do you think your child will go in school? (Original)	N.A. (single item)
Maternal aspiration for child's education (1)	How far do you hope your child will go in school? (Original)	N.A. (single item)
Paternal identification (16)[b]	How much do you admire your father in his role as a parent?	0.85
Child's resistance to paternal control (5)	Your child often breaks your rules. (Schaefer & Finkelstein, 1975)	0.91

[a] Consists of maternal admiration, emulation, and similarity scales.
[b] Consists of paternal admiration, emulation, and similarity scales.

6.2.4. Parental education, occupation, and smoking at Time 2 (T2)

Continuous measures of maternal and paternal schooling were used and combined into the parental education latent variable. The medians for maternal schooling and paternal schooling were 12 (interquartile range=2 grades) and 12 (interquartile range=2 grades), respectively. This represents an educational level slightly above the 12th grade level. The correlation between these two variables was 0.62 ($p<0.001$). A dichotomous variable of parental occupation was constructed, based on categories delineated in Hollingshead's (1957) two-factor index of social position, and included in the analysis. We dichotomized this variable based on prior research, which has found higher rates of smoking (and lower rates of cessation) among blue-collar (manual) versus white-collar (non-manual) workers (Davey Smith et al., 1998; Gilman et al., 2003; Nelson et al., 1994; Niknian, Linnan, Lasater, & Carleton, 1991; Sorensen, 2001). In the present study, a score of 1 was assigned if either the mother or the father was employed in a white-collar profession. The white-collar category was defined as one of the following: executives and proprietors of large concerns and high-level professionals, managers and proprietors of medium-sized businesses and mid-level professionals, administrative personnel of large concerns, owners of small independent businesses and semiprofessionals, and technicians, clerical workers, or salespersons. A score of 0 was assigned if neither the mother nor the father had a white-collar job, and if either worked in a skilled, a semiskilled, or an unskilled job (such as electrician, plumber, hairdresser, truck driver, waitress, housepainter, etc.). Continuous measures of maternal and paternal tobacco use were included and grouped into the parental smoking latent variable. Each of the measures had a scale ranging from none (1) to more than one pack a day (5). The mean scores were 2.26 (S.D.=1.57) and 2.49

(S.D.=1.67), respectively, for mothers and fathers. Thus, the average number of cigarettes smoked by both parents was less than half a pack a day. The correlation between maternal tobacco use and paternal tobacco use was 0.39 ($p<0.001$). Less than 1% of all data from each of the five time waves was missing. Missing data were imputed by calculating an average of the participant's response to the missing item at all other time waves.

6.3. Plan of analysis

Our plan of analysis was to use Structural Equation Modeling (SEM) to test whether the data fit the hypothesized model shown in Fig. 1. Our model enabled us to test for both direct and indirect effects of observed and latent variables on tobacco use in adult offspring in their late 20s (T5).

We initially tested the model for the prediction of tobacco use in late adolescence (T4) from parental occupation, parental education, and parental smoking at T2, and parent–child relations at T3. Subsequently, we fit the model to predict the effects of these same variables on offspring tobacco use in the late 20s (T5), with control on the effects of tobacco use at T4. The standard regression weights and *t*-tests for T5 smoking are depicted in the path diagram shown in Fig. 2.

7. Results

Latent variable Structural Equation Models using LISREL VIII (Jöreskog & Sörbom, 1996) were used to examine the empirical credibility of the proposed model presented in Fig. 1. The tests were based on the asymptotic covariance matrix and used weighted least square estimation. The following fit indices were obtained: RMR=0.089, GFI=0.93, and AGFI=0.89. These results reflect a satisfactory model fit. The obtained path diagram along with the standardized regression weights are depicted in Fig. 2. As noted in Fig. 2, parental education (T2), parental occupation (T2), and parental smoking (T2) had statistically significant paths to

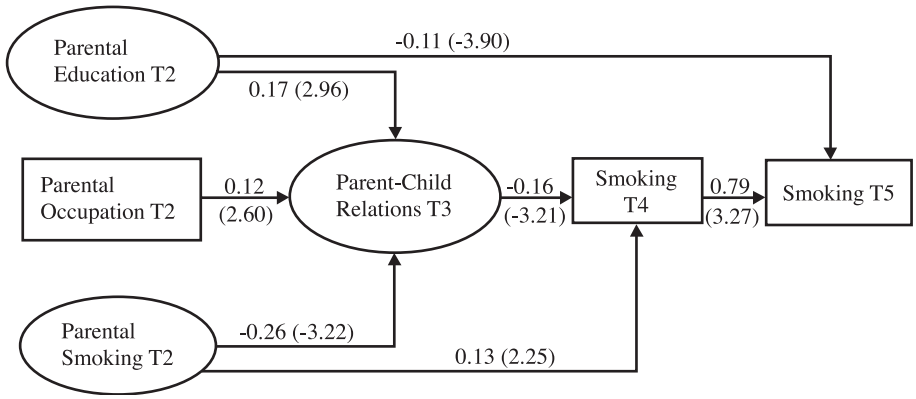

Fig. 2. LISREL model predicting offspring smoking in the late 20s (T5) from parental education, occupation, smoking, and child-rearing variables.

parent–child relations (T3; t=2.96, t=2.60, and t=−3.22, respectively). Parent–child relations at T3 had a significant path to offspring tobacco use at T4 (t=−3.21), and tobacco use at T4 had a significant path to T5 tobacco use (t=3.27). (All t-values are significant at p<0.05 and are based on a two-tailed test; see Fig. 2.) Similar results had been obtained when we tested the pathways from parental education, parental occupation, parental smoking, and parent–child relations to tobacco use at T4 (independent of tobacco use at T5).

An examination of the total effects of each variable estimated in the analysis of tobacco use at T5 helps in the interpretation of the structural coefficients. The total effects showed that T2 parental education (t=−4.37), parental occupation (t=−2.29), and parental smoking (t=2.88), T3 parent–child relations (t=−3.18), and T4 late adolescent tobacco use (t=23.27) all had a significant total effects on tobacco use at T5. (All t-values are significant at p<0.05 and are based on a two-tailed test.) The total effect analysis also demonstrated that there was a great stability in offspring tobacco use from T4 to T5 (t=3.27).

7.1. Supplementary analysis

We also conducted a supplementary analysis of the Pearson correlations for the child-rearing variables with offspring tobacco use at T4 (see Table 2). The obtained associations between the parental child-rearing variables and tobacco use at T4 were significant (p<0.05) with the exception of maternal encouragement of child's ideas. Maternal educational expectations and aspirations were more highly related to tobacco use at T4 than the other measures of the parent–child relationship.

8. Discussion

The present inquiry was guided by two objectives. The first was to extend previous research by examining the independent associations between two components of parental SES (educational attainment and blue-collar/white-collar occupational status) and adult

Table 2
Pearson correlations between parent–child relations and offspring tobacco use at T4

Variables	Tobacco use at T4
Maternal identification	−0.09*
Mother encourages child's ideas	−0.03
Child's resistance to maternal control	0.16***
Maternal satisfaction with child	−0.16***
Maternal expectation of child's education	−0.23***
Maternal aspiration of child's education	−0.21***
Paternal identification	−0.14***
Child's resistance to paternal control	0.13***

* p<0.05.
**p<0.01.
*** p<0.001.

offspring smoking. The second goal was to examine the intervening factors between parental educational achievement, parental occupational status, and parental smoking, and smoking in their offspring when the latter reach adulthood. We hypothesized that the latent variable of parent–child relations as well as late adolescent smoking would intervene between parental occupation, education, and smoking, and the adult child's smoking behavior. To our knowledge, this is the first study conducted in the United States to independently examine two components of parental SES, parent–child relations, and offspring smoking over a period of approximately 25 years.

The findings of our study are consistent with previous research, which has demonstrated a relationship between parental SES and adult offspring smoking behavior (Gilman et al., 2003; Huurre et al., 2003). In contrast to these prior investigations, however, our constructs assessed both maternal and paternal educational level and occupational status. Moreover, the results from the current study add to the literature by showing that both components of parental SES (low educational achievement and blue-collar status) predict smoking in their adult offspring, although the respective pathways were somewhat different. Specifically, parental education showed a direct pathway to offspring smoking at T5, whereas the parental occupation pathway was mediated by smoking at T4. Consistent with our model and the findings of other researchers (e.g., Huurre et al., 2003), it is possible that parental education impacts adult offspring smoking primarily through its association with the offspring's own educational achievement in adulthood and, secondarily, via its impact on the parent–child relationship. It is noteworthy, in this vein, that maternal expectations and aspirations for their child's education (T2) were the most significant components of the parent–child relationship with respect to offspring smoking.

The results of the present study also supported our hypothesis regarding the mediational role of the parent–child relationship. Consistent with a family interactional framework (Brook et al., 1990), we found that parental blue-collar (versus white-collar) occupational status was associated with less parent–child mutual attachment (e.g., greater parent–child conflict, less identification with the parent), and lower parental educational aspirations for their children. Also as posited by the family interactional framework and consistent with the findings of other researchers (Brook et al., 1990; Doherty & Allen, 1994; Fleming et al., 2002), our results showed that a weaker parent–child bond was associated with smoking in late adolescence. It should be noted that the most powerful predictor of adult offspring smoking at T5 was smoking in late adolescence (T4). This attests to the strong stability of smoking behavior over time, and corroborates that smoking in adolescence is likely to persist into adulthood (Chassin et al., 1996). Thus, the results support our hypothesis that late adolescent smoking would intervene between parental blue-collar/white-collar occupational status and adult offspring smoking.

Because parents who are blue-collar workers are more likely to smoke than their white-collar counterparts (Barbeau, Krieger & Soobader, 2004; Davey Smith et al., 1998; Nelson et al., 1994; Niknian et al., 1991; Sorensen, Barbeau, Hunt, Emmons, 2004; Turrell et al., 2002), they may present a model of smoking behavior to their children, who are therefore at increased risk for tobacco use (Andrews, Hops, Ary, Tildesley, & Harris 1993; Pedersen & Lavik, 1991). The importance of parental role modeling to offspring tobacco use is supported by the finding of a direct path in our model from parental smoking at T2 to late adolescent smoking (T4).

Within our sample, offspring smoking during late adolescence (T4) was highly correlated with adult offspring smoking during the late 20s. This finding may indicate that certain personality and behavioral tendencies, associated with T4 smoking, remain stable over time (e.g., educational aspirations, intrapersonal distress, attempt at self-medication, genetic factors, and the long-term addictive properties of nicotine).

8.1. Limitations

The present study has several limitations. First, because the study was conducted with a predominantly Caucasian cohort, the findings need to be replicated with diverse ethnic populations. For example, in related studies with minority populations in the United States, as well as in South Africa, and Colombia, South America, we have found that it is important to examine the protective effects of ethnic identification for a more complete understanding of the predictors of tobacco use. Second, we can only present the temporal relations among the sets of variables in our model, but cannot document causality. However, because our analyses used SEM and comprised parental factors, parental–adolescent relationship factors, and adolescent smoking from previous time waves, we are able to suggest the possibility of a causal ordering of these constructs.

Despite the limitations, the results of this investigation provide important new evidence regarding the relation of two components of SES (parental educational attainment and occupational status) to offspring smoking behavior when the latter reach adulthood. Our results indicate that the parent–child bond is a significant mediator between lower parental educational achievement and parental blue-collar status and offspring smoking behavior. There is also some evidence that parental educational achievement is a significant predictor of adult offspring smoking based upon the direct and indirect paths found in our model. The analysis of our five-wave model spanning 25 years also demonstrates the long-term impact of parental smoking during childhood as a risk factor for offspring smoking behavior at 27 years of age.

Parental SES and parental smoking are important to take into consideration in the establishment of smoking prevention and intervention programs. Helpful to these programs are our results that point to the processes that intervene between parental educational level and parental occupational status and adult offspring smoking behavior, namely, the parent–child bond. Improvement of the parent–child relationship, therefore, might serve to buffer against the more distal factors of parental education, occupation, and smoking with respect to offspring tobacco use.

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