

Family Socialization of Adolescent's Self-Reported Cigarette Use: The Role of Parents' History of Regular Smoking and Parenting Style

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Objective To examine the main and interactive effects of parental history of regular cigarette smoking and parenting style on adolescent self-reported cigarette use. **Methods** Predictors of adolescent self-reported cigarette use, including parents' history of regular cigarette smoking and two dimensions of parenting behavior, were analyzed in a sample of 934 predominately Caucasian (96.3%) parent-adolescent dyads. Families were drawn from the control group of a randomized control trial aimed at preventing adolescent substance use. **Results** In addition to the main effects of parents' history of regular smoking and parental warmth, logistic regression analysis revealed that the interaction of these two variables was associated with adolescent self-reported cigarette use. Parental warmth was associated with a decreased likelihood of the adolescent ever having smoked a cigarette; however, this was true only if neither parent had a history of regular cigarette smoking. **Conclusions** Findings suggest that adolescent smoking prevention programs may be more efficacious if they address both parental history of regular smoking and parenting behavior.

Key words adolescence; family health; parental smoking; parenting; smoking.

Cigarette smoking is the single largest cause of preventable disease, chronic disability, and premature death in the United States [US Department of Health and Human Services (USDHHS), 1994]. Importantly, the prevalence of cigarette smoking has steadily declined among adults in the US (USDHHS, 1995); however, adolescents continue to initiate and maintain cigarette smoking at alarming rates (Johnston, O'Malley, & Bachman, 2000). Risk for adolescent smoking appears to be most pronounced during the transition from middle to high school (Brynin, 1999). This may be particularly true for Caucasian adolescents, who tend to use tobacco products at greater rates than do adolescents of other ethnicities [Centers for Disease Control and Prevention (CDC), 2002]. Given that individuals who use cigarettes during adolescence are more likely to be adult smokers

as well (e.g., Chassin, Presson, Rose, & Sherman, 1996), identifying correlates of cigarette use during this risky developmental transition is critical for the advancement of successful smoking prevention efforts.

Although peer smoking has been identified as a robust correlate of adolescent cigarette use (see Hoffman, Sussman, Unger, & Valente, 2006 for a review), a growing literature highlights the important role of parental smoking, parenting behavior as well (e.g., Galambos, Barker, & Almeida, 2003). Parents who smoke are more likely to have adolescents who initiate cigarette smoking (e.g., O'Byrne, Haddock, Poston, & Mid-American Heart Institute, 2002) and who are less likely to quit or decrease their use of cigarettes once they start (Chassin, Presson, Rose, Sherman, & Prost, 2002; Fleming, Kim, Harachi, & Catalano, 2002), particularly if both parents smoke

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(e.g., Li, Pentz, & Chou, 2002). Of course, not all adolescents whose parents smoke or have a history of smoking will use cigarettes themselves (O'Byrne et al., 2002), suggesting that other factors, including additional family socialization variables, may moderate adolescent risk. Consistent with this notion, parenting style has received growing attention in the adolescent smoking literature (e.g., Adamczyk-Robinette, Fletcher, & Wright, 2002). Prior research has documented a link between authoritative parenting, as first discussed by Baumrind (1978), and positive youth adjustment [for a review see Steinberg (2001)]. When parents are warm and involved, yet also effective in monitoring child behavior and establishing firm and consistent control, children are more likely to evidence greater social competence, academic performance, and psychological well-being (Basic Behavioral Science Task Force, 1996). Deficits in authoritative parenting (i.e., inadequate warmth or control) can be associated with long-term negative consequences, including chronically elevated levels of internalizing and externalizing problems (Jones, Forehand, & Beach, 2000), as well as increased rates of substance use, including cigarette smoking (e.g., Adamczyk-Robinette et al., 2002; Chassin, Presson, Todd, Rose, & Sherman, 1998; Melby, Conger, Conger, & Lorenz, 1993).

Despite the growing number of studies demonstrating the effects of parental smoking and parenting style on youth cigarette use, a relatively small literature has been devoted to examining the interrelationship of these two family variables in studies of adolescent smoking (Andrews, Hops, & Duncan, 1997; Doherty & Allen, 1994; Foshee & Bauman, 1992). Consistent with the literature documenting the benefits of authoritative parenting, Doherty and Allen (1994) found that parents who currently smoked *and* reported greater levels of emotional bonding with their children were less likely to have adolescents who smoked cigarettes than did those parents who smoked, but reported lower levels of emotional bonding. Emotional bonding, which can be described as a proxy for parent-child warmth, thus served as a buffer against smoking for those children whose parents were current smokers. Foshee and Bauman (1992) similarly found a positive effect of adolescent-reported attachment to the parent; however, such attachment was only associated with lower levels of adolescent smoking if neither parent had a lifetime history of smoking. Contrary to Doherty and Allen's (1994) results, among youth whose parents had a history of smoking, greater attachment was actually associated with an *increased* risk for smoking in the

Foshee and Bauman (1992) study. This is more consistent with the results of Andrews and colleagues (1997) who found that, when mothers had a lifetime history of smoking and their adolescents perceived the mother-child relationship to be positive and low in conflict, adolescents were more likely to have smoked than if they perceived their relationships with their mothers to be more negative in nature. Such an interaction was not obtained for father smoking and father-child relationship quality. In sum, while some evidence (e.g., Doherty & Allen, 1994) suggests that more positive parent-child relationships buffer the potentially negative effects of parental smoking on adolescent smoking, other researchers (e.g., Foshee & Bauman, 1992; Andrews et al., 1997) warn that, in the context of parental transmission of smoking behavior, better relationships with parents are not always more protective.

Inconsistent results obtained in the aforementioned studies may be the result of differing definitions of parental smoking. For instance some researchers (e.g., Doherty & Allen, 1994) examine parent report of current smoking, while others (e.g., Andrews et al., 1997; Foshee & Bauman, 1992) rely on parent report of lifetime history of smoking. Consistent with social learning theory (Bandura, 1977), studies of current parental smoking are grounded in the hypothesis that the primary mechanism by which parents transmit smoking behavior to their children is through modeling. While modeling of current parental smoking is certainly one mechanism by which parents may transmit smoking to their offspring, other literature suggests that a focus on current parental cigarette use alone may fail to adequately capture the risk associated with parental smoking (Bauman, Foshee, Linzer, & Koch, 1990). It is now clear that parental smoking may impact children through a variety of mechanisms in addition to modeling, including increased sensitivity to nicotine for youth whose mothers smoked during pregnancy and, in turn, increased risk for continuing smoking after initial experimentation (e.g., Cornelius, Leech, Goldschmidt, & Day, 2005; Roberts et al., 2005). Furthermore, former smokers have been shown to influence their children's risk for smoking via attitudes toward both smoking behavior and individuals who smoke (e.g., Bricker, Leroux, Robyn Andersen, Rajan, & Peterson, 2005). Accordingly, studies which assess parental lifetime history of regular cigarette smoking, rather than current cigarette use alone, may better capture the level of risk for cigarette use among offspring.

Notably, the aforementioned studies also vary in the parenting constructs examined. Emotional bonding (Doherty & Allen, 1994), parent-child attachment (Foshee & Bauman, 1992), and parent-child relationship quality (Andrews et al., 1997) likely reflect to varying degrees this concept of parental warmth/support that is integral to authoritative parenting, yet they tell us little about the specific parenting behaviors in which parents are engaging. A clear understanding of the ways in which parents convey warmth and support to their adolescents is necessary if parenting practices are to be effectively targeted as part of adolescent smoking prevention. Furthermore, none of the studies to date have analyzed the effect of the second dimension of authoritative parenting, namely monitoring/control. The exact role of parental control in either buffering or exacerbating adolescent smoking within the context of parental smoking is not apparent at this time. Finally, given that only one of the existing studies (Foshee & Bauman, 1992) controlled for peer smoking in their statistical analyses, little can be definitively said of the relative importance of parental smoking, parenting behavior, or the interaction of the two family socialization variables over and above the well-documented, robust influence of peers.

In an effort to guide the development of family-based smoking prevention efforts, the current study attempts to address these limitations by examining parental lifetime history of smoking, two specific types of authoritative parenting behaviors (warmth and control), and adolescent cigarette use, after controlling for peer smoking, in a largely Caucasian sample during the risky transition from middle to high school. It was predicted that parental smoking history and both parental warmth and control each would be uniquely associated with youth cigarette use. Consistent with the separately evolving literatures on these two family socialization variables, a history of parental smoking was expected to be a risk factor for youth cigarette use, while both parental warmth and control were expected to protect youth from cigarette use. It was predicted, however, that the interpretation of the main effects would be qualified by the interaction of parental smoking with each of the two parenting variables. Building on the literature documenting the robust protective effects of an authoritative parenting style (Basic Behavioral Science Task Force, 1996), it was expected that the risk associated with a parental lifetime history of smoking would be buffered for those youth whose parents engaged in higher levels of warmth and control. Importantly, the current study included

data on fathers, providing the opportunity to examine the documented increased risk for youth smoking associated with both maternal and paternal history of smoking (e.g., Li et al., 2002), as well as paternal parenting behavior.

Method

Overview

The Dartmouth Prevention Project was an NIAAA-funded randomized controlled trial (1992–1996) aimed at preventing child and adolescent substance use (Jones et al., 2005; Stevens et al., 2002). A cohort of 5th and 6th grade students and one of their parents were recruited at well-child visits in 12 pediatric primary care practices in northern New England. The pediatric practices were randomly assigned to an alcohol and tobacco use prevention condition (substance use) or a gun, seat belt, and bicycle helmet safety condition (control). Participating parent-child dyads were followed for 36 months, with an initial baseline assessment, then 12, 24, and 36 months later.

Of the 4,096 families approached during the recruitment period, 3,585 met grade eligibility requirements. Of these eligible families, 370 provided both verbal and written informed consent during the well-child visit, but either failed to return baseline surveys or otherwise declined participation. A total of 3,215 (90%) families provided informed consent and completed baseline surveys, and were classified as study participants. By the 36-month assessment, 2,153 families remained in the study.

Reasons for attrition included losing contact with families who moved ($n = 123$) and withdrawal because families moved away or were too busy to participate ($n = 36$). Failure to return surveys at the 36-month assessment was more likely among older boys ($t = 3.02$, $p < .01$), families with less educated parents ($t = -3.76$, $p < .001$), and lower-income families ($t = -5.66$, $p < .001$).

Participants

The present study represents secondary analysis of data from the subset of families in the control condition of the Dartmouth Prevention Program who were retained at the 36-month assessment ($n = 934$). We focused on families in the control condition because these families did not receive the substance use prevention messages. Additionally, adolescents were in the age range at the 36-month assessment ($M = 14$ years) when smoking initiation is most likely to occur (Brynin, 1999), and

prior assessments yielded inadequate variability to examine adolescent smoking or changes in adolescent smoking behavior. Although it is plausible that the safety (gun, seat belt, and bicycle helmet) prevention messages delivered to youth in the control group may have generalized to other health risk behaviors, including cigarette smoking, prior findings from this project demonstrate that there were no main effects of the prevention program on adolescent alcohol or tobacco use (Jones et al., 2005; Stevens et al., 2002). Additional demographic information for the current sample is presented in Table I.

Procedures

Questionnaire packets were mailed to each participating parent and child who was instructed to complete and return their respective questionnaire packets independently. Once both the parent and child questionnaire

packets were returned, the child received \$5. If questionnaires were not returned in four weeks, the family received a reminder card. If the questionnaires were not returned in six weeks, the family received a reminder telephone call. All study procedures were approved by the Institutional Review Board at Dartmouth Medical School.

Measures

All measures examined in the current study were collected from parents and adolescents at the 36-month assessment.

Demographic Variables and Covariates

Parents and adolescents each completed a series of demographic questions (Table I). Parents reported their gender, marital status, annual household income, level of education, and occupation. These latter two variables were combined to create social class scores using

Table I. Summary of Demographic Variables and Bivariate Associations with Adolescent Lifetime Smoking ($n = 934$)

Variable	%	Adolescent lifetime smoking, n (%)		M (SD)	F
		χ^2	No		
Adolescent age				13.90 (0.81)	1.28
Adolescent gender		.52	360 (80.0)	90 (20.0)	
Female	48.1		397 (81.8)	88 (18.1)	
Male	51.9				
Adolescent ethnicity		3.10			
Caucasian	96.3		699 (80.3)	171 (19.6)	
Other	3.7		58 (89.2)	7 (10.8)	
Parent gender					
Female	89.2	.11	674 (80.8)	160 (19.2)	
Male	10.8		83 (82.2)	18 (17.8)	
Parent marital status		27.29*			
Currently married	85.9		671 (83.7)	131 (16.3)	
Not currently married	14.1		85 (64.4)	47 (35.6)	
Parent years of education				14.79 (2.57)	2.20**
Parent employment status		17.27*			
Employment full time	60.7		419 (78.3)	116 (21.7)	
Employment part time	25.2		189 (85.1)	33 (14.9)	
Stay-at-home parent	11.3		90 (90.0)	10 (10.0)	
Unemployed	2.8		15 (60.0)	10 (40.0)	
Socioeconomic status		7.54			
Upper class	36.9		229 (77.9)	65 (22.1)	
Upper-middle class	26.6		173 (81.6)	39 (18.4)	
Middle class	30.9		207 (84.1)	39 (15.8)	
Lower-middle class	2.8		18 (81.8)	4 (18.2)	
Lower class	2.8		14 (63.6)	8 (36.4)	
Annual household income		31.45*			
>50,000	68.6		525 (85.4)	90 (14.6)	
25,000–50,000			158 (75.2)	52 (24.8)	
<25,000			43 (60.6)	28 (39.4)	

* $p < .001$, ** $p < .01$.

Hollingshead's (1975) two-factor index of social position. Social position scores ranged from 11 (professional) to 77 (unemployed) and were converted into five social classes. The majority of participating families (37%) were defined as upper class and most (69%) reported annual household incomes exceeding \$50,000. Furthermore, most of the participating parents (89%) were mothers and the majority (86%) were married.

Adolescents reported their age, gender, ethnicity, and level of peer smoking. Gender distribution was fairly equal (48% female), with a mean age of 13.90 ($SD=0.81$). The majority of participating adolescents (96%) self-identified as Caucasian. In order to account for the influence of peers on adolescent smoking, each adolescent was asked to report whether any of his or her friends smoked cigarettes fairly often (0=no; 1=yes). Thirty percent of participating adolescents reported peer smoking.

Parents' History of Regular Cigarette Use

Parental cigarette use was measured by the participating parent reporting her or his own smoking, as well as his or her spouse's or partner's smoking. Participating parents were asked, "Have you ever been a regular smoker?" (0=no; 1=yes), as well as "Has your spouse or partner ever been a regular smoker?" (0=no; 1=yes). Responses to these two questions were combined and trichotomized to form a new parental smoking variable (0=neither parent has been a regular smoker; 1=one parent has been a regular smoker; 2=both parents have been regular smokers).

Authoritative Parenting

Two domains of parenting behaviors were measured by adolescent report on the parental control and parental warmth subscales of a parenting measure developed by Barnes and Farrell (1992). Adequate reliability has been demonstrated for each subscale, with alpha coefficients of .80 for adolescent report of maternal support and .84 for adolescent report of paternal support (Barnes & Farrell, 1992). Alpha coefficients for adolescent reports of maternal and paternal control are .73 and .85, respectively (Barnes & Farrell, 1992).

Parental warmth was assessed using five items from the Barnes and Farrell (1992) parenting measure. Adolescents indicated on a 5-point Likert-type scale (ranging from *always* to *never*) the frequency with which each parent engages in five supportive responses (e.g., "How much do you rely on your mother (father) for advice or guidance?"). Possible scores ranged from 5 to 25 and items were reverse-scored such that higher

scores indicated more warmth. Alpha coefficients for adolescent reports of mother support (.78) and father support (.80) in the current study were adequate.

Parental control was assessed using seven items from the Barnes and Farrell (1992) measure. Adolescents used a 5-point Likert-type scale (ranging from *always* to *never*) to indicate the frequency with which each parent engaged in seven control strategies after the child has disobeyed or done something that the parent does not approve of (e.g., tells you how you are expected to act in the future, warns you not to do something again). Possible scores ranged from 7 to 35 and items were reverse-scored for ease of interpretation such that higher scores indicated more parental control. For the current study, alpha coefficients for adolescent reports of mother control and father control were .68 and .78, respectively.

Given the moderate correlations between maternal and paternal warmth ($r=.54$, $p<.001$) and between maternal and paternal control ($r=.64$, $p<.001$), maternal and paternal parenting scores were averaged in order to form two family-level parenting style variables (parental warmth and parental control). Obtained scores for parental warmth and parental control in the current sample range from 5 to 26 and from 7 to 32, respectively, with higher scores indicating greater levels of the respective parenting behavior.

Adolescent Self-Reported History of Cigarette Use

Adolescent cigarette use was measured by adolescent report of lifetime cigarette use. Adolescents were asked, "Have you ever smoked cigarettes?" (1=never; 2=once or twice; 3=occasionally but not regularly; 4=regularly in the past; 5=regularly now). Given that few (19%) of the respondents endorsed having ever tried smoking, responses were dichotomized (0=never smoked; 1=ever smoked) for ease of analysis.

Results

Preliminary Analyses

The prevalence of lifetime and current smoking was examined for both adolescents and parents (Table II). Adolescent lifetime smoking rates for the current study were much lower than the national average of 46.4% among 8th graders reported during 1995, when data collection occurred (Johnston, O'Malley, & Bachman, 1997). Overall, 19% of adolescents reported having tried smoking at least once during their lifetimes, with girls reporting slightly more smoking (girls=20.3%; boys=17.9%). Thirty-day prevalence rates of smoking

among these adolescents also were much lower than the 1995 national average of 19.1% among 8th graders (Johnston et al., 1997). Only 4.5% of adolescents in the present sample reported recent smoking, with girls again reporting slightly higher levels (girls = 5.6%; boys = 3.5%). The somewhat higher rates of lifetime and current smoking among girls in

the present study are similar to trends observed in national substance use surveys (e.g., Johnston et al., 1997, 2000).

Among 16.7% of families, both mothers and fathers had a lifetime history of regular smoking. Parent lifetime prevalence rates varied substantially by gender. Fifty-five percent of mothers reported having smoked regularly

Table II. Summary of Major Study Variables and Bivariate Associations with Adolescent Lifetime Smoking ($n = 934$)

Variable	%	Adolescent lifetime smoking, n (%)		M (SD)	F
		χ^2	No		
Adolescent smoking					
Have smoked in lifetime	19.0				
Female	20.3				
Male	17.9				
Have smoked in past month	4.5				
Female	5.6				
Male	3.5				
Peer smoking		187.77*			
No	69.9		594 (64.8)	47 (5.1)	
Yes	30.1		149 (54.0)	127 (46.0)	
Participating parent smoking					
Lifetime		.001			
No	61.5		318 (80.9)	75 (19.1)	
Yes	38.5		439 (81.0)	103 (19.0)	
Past month		1.35			
No	85.9		655 (81.6)	148 (18.4)	
Yes	14.1		102 (77.3)	30 (22.7)	
Participating mother smoking					
Lifetime		.01			
No	44.9		277 (81.0)	65 (19.0)	
Yes	55.1		397 (80.7)	95 (19.3)	
Past month		1.69			
No	85.7		583 (81.5)	132 (18.5)	
Yes	14.3		91 (76.5)	28 (23.5)	
Participating father smoking					
Lifetime		.22			
No	64.4		41 (80.4)	10 (19.6)	
Yes	35.6		42 (84.0)	8 (16.0)	
Past month		.06			
No	87.1		72 (81.8)	16 (18.2)	
Yes	12.9		11 (84.6)	2 (15.4)	
Cumulative parent lifetime smoking					
Neither have smoked	45.4	16.95*	368 (86.6)	57 (13.4)	
One has smoked	37.9		274 (77.4)	80 (22.6)	
Both have smoked	16.7		115 (73.7)	41 (26.3)	
Parental warmth					
Mothers				18.14 (3.59)	2.80*
Fathers				19.19 (3.97)	.88
Parental control					
Mothers				17.10 (4.45)	.92
Fathers				20.41 (4.02)	1.23
Mothers				20.80 (4.12)	.71
Fathers				20.02 (4.90)	1.06

* $p < .01$.

at some point in their lives, which is higher than participating fathers (35.6%), but still lower than the 1997 national average for adults aged 35 years and older (70.5%) (Department of Health and Human Services, 1999). Participating mothers also reported slightly higher rates of smoking within the past thirty days than did participating fathers (mothers = 14.3%; fathers = 12.9%), although both mothers and fathers in this study reported recent smoking rates much lower than the 1995 national average of 24.7% for adults (CDC, 1997).

Associations between each demographic variable and adolescent self-reported history of cigarette use were examined (Table I). The following variables were significantly associated with adolescent smoking: parent marital status [$\chi^2(1, 934) = 27.29, p < .001$], parent level of education [$F(20, 908) = 2.20, p < .01$], parent employment status [$\chi^2(3, 882) = 17.27, p < .001$], and annual household income [$\chi^2(2, 896) = 31.45, p < .001$]. Adolescents from single-parent households were significantly more likely to have smoked, as were those from lower-income homes. Parent unemployment and lower levels of parent education also were each significantly associated with adolescents having tried cigarettes. Still, the most robust correlate of adolescent smoking was peer smoking [$\chi^2(1, 917) = 187.77, p < .001$]. As presented in Table II, adolescents who perceived that their friends smoked fairly often were much more likely to have tried cigarettes themselves. Given these significant bivariate associations, parent marital status, parent level of education, parent employment status, annual household income, and peer smoking each were statistically controlled in the primary analyses.

Descriptive statistics for major study variables are presented in Table II, as are the bivariate associations between each independent variable and adolescent self-reported history of cigarette use. Adolescents were more likely to have tried cigarettes if one or both parents have smoked regularly [$\chi^2(2, 935) = 16.95, p < .01$]. In contrast, higher levels of parental warmth were significantly associated with adolescents having abstained from cigarette use during their lifetimes [$F(66, 868) = 2.80, p < .01$]. No associations were found for parental control [$F(72, 862) = 1.23, n.s.$].

Preliminary analyses were conducted to determine whether either parent or adolescent gender was a moderator of the proposed hypotheses. Neither moderated the findings presented here and, therefore, were not considered further.

Primary Analyses

Proposed hypotheses were examined using logistic regression analysis. Stepwise entry of variables was conducted in the following order: peer smoking and the aforementioned demographic controls were entered in Block 1; the main effects of parental history of regular smoking, warmth, and control were entered in Block 2; and the two-way interactions of parental smoking \times parental warmth and parental smoking \times parental control were entered in Block 3. Variables within each block were entered simultaneously.

Results are shown in Table III. Although not the direct focus of this study, it is important to note that peer smoking was strongly associated with adolescent self-reported cigarette use in the regression analysis [odds ratio (OR) = 9.93; confidence interval (CI) = 6.68–14.78; $p < .001$]. Adolescents whose peers had smoked were nearly 10 times more likely to have smoked than adolescents whose peers had not smoked. Over and above the main effect of peer smoking, however, a significant main effect was found for parental history of regular smoking. Compared with families in which neither parent had a history of regular smoking, adolescents in families in which one parent had a history of regular smoking were 1.6 times more likely to have smoked (OR = 1.63; CI = 1.04–2.56; $p < .01$), while those in families in which both parents had smoked regularly were nearly twice as likely to have smoked (OR = 1.95; CI = 1.11–3.40; $p < .01$). Furthermore, adolescents whose parents had engaged in higher levels of parental warmth were less likely to have tried cigarettes (OR = .90; CI = .85–.95; $p < .001$), although no significant effects were found for parental control (OR = 1.00; CI = .96–1.05; *n.s.*). A parental warmth \times parental smoking interaction also was significant (OR = 1.07; CI = 1.01–1.14; $p < .05$).¹

Explication of the significant interaction was conducted in accordance with the recommendations of Aiken and West (1991) (Fig. 1). Notably, the protective role of parental warmth occurred only when neither parent had a history of regular smoking ($t = -3.65, p < .001$). Thus, parental warmth was not protective if one ($t = -1.27, n.s.$) or both ($t = -.32, n.s.$) parents had a history of regular smoking.

¹Given that we did not ask “single” parents (14.1% of sample) whether they reported on the smoking status of the child’s nonparticipating biological parent (or another partner), we re-analyzed the data including only married parents. These analyses yielded the same pattern of findings which are available upon request from the second author.

Table III. Summary of Logistic Regression Analysis Predicting Adolescent Smoking from Parental Smoking, Warmth, and Control ($n = 934$)

Variable	OR	95% CI	B	Model χ^2	-2 log likelihood
Block 1: Demographic controls				183.28*	659.80
Peer smoking					
Yes	9.93	6.68–14.78	2.30*		
No ^a	1.00				
Parent employment status					
Not employed	.87	.51–1.49	-.14		
Employed ^a	1.00				
Parent education level					
Increasing	.92	.85–1.00	-.08		
Annual household income					
<25,000	2.24	1.05–4.77	.80*		
25,000–50,000	1.52	.94–2.45	.42		
>50,000 ^a	1.00				
Parent marital status					
Not married	1.58	.89–2.12	.46		
Married ^a	1.00				
Block 2: Major study variables				208.29*	634.79
Parental smoking					
Both have smoked	1.95	1.11–3.40	.66***		
One has smoked	1.63	1.04–2.56	.49***		
Neither has smoked ^a	1.00				
Parental warmth					
Increasing	.90	.85–.95	-.10*		
Parental control					
Increasing	1.00	.96–1.05	.00		
Block 3: Interactions				208.15*	634.93
Parental smoking \times parental warmth	1.07	1.01–1.14	.07**		
Parental smoking \times parental control	1.00	.94–1.07	.00		

^aReferent group.

* $p < .001$, ** $p < .05$, *** $p < .01$.

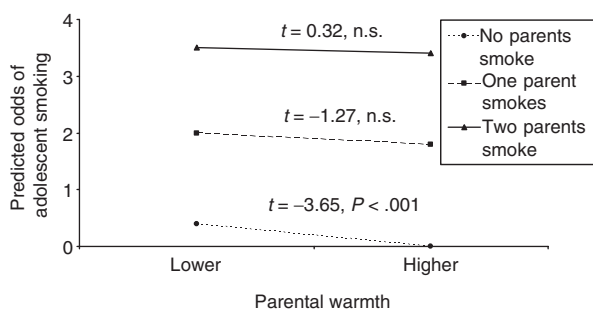


Figure 1. Predicted odds of adolescent smoking as a function of parental warmth and parental smoking.

Discussion

This study examined the main and interactive effects of parental lifetime history of regular smoking and authoritative parenting behavior on adolescent self-reported cigarette use. Consistent with prior literature (e.g., Hoffman et al., 2006), peer smoking was a

robust correlate of adolescent smoking; however, consistent with a growing body of theoretical and empirical work (e.g., Galambos et al., 2003), we found that family variables were significant correlates of adolescent smoking behavior as well. Notably, the odds of an adolescent reporting the use of cigarettes were greatest when both of their parents reported a lifetime history of regular use. This finding is consistent with previous work which suggests a child's odds of smoking increases with each parent who smokes (e.g., O'Byrne et al., 2002).

In addition to parental smoking, parenting behavior was associated with adolescent self-reported cigarette use. Consistent with the bivariate analyses, parental warmth, but not control, was associated with adolescent self-reported cigarette use in the multivariate model. Similar to the findings from prior research on authoritative parenting behavior (e.g., Adamczyk-Robinette et al., 2002), higher levels of parental warmth were associated

with decreased risk that adolescents had ever smoked a cigarette. The present findings are consistent with a growing body of literature which suggests that parental warmth in particular may be an important mechanism through which parents may protect youth from negative outcomes (e.g., Lamborn, Mounts, Steinberg, & Dornbusch, 1991; Masten & Coatsworth, 1998), including less substance use (Rai et al., 2003). It is the case that the literature on risk for adolescent substance use has more traditionally focused on the monitoring and control dimension of authoritative parenting (e.g., Stanton et al., 2004); however, authoritative parenting is conceptualized as the relative contribution of both warmth/support and monitoring/control. Thus, our findings suggest that the parental warmth dimension of authoritative parenting should perhaps be given more attention in future research on predictors of adolescent smoking.

The main effects of parental smoking and parental warmth, however, were qualified by the obtained interaction of the two variables. Contrary to our hypotheses, the buffer afforded by parental warmth was limited to families in which neither parent had a smoking history. That is, in contrast to the findings of Doherty and Allen (1994), parental warmth did not buffer the increased risk for cigarette use among youth whose parents reported a lifetime history of regular smoking. It is important to note, however, that parental warmth also did not exacerbate smoking risk for adolescents under these conditions as has been reported in some prior research (Andrews et al., 1997; Foshee & Bauman, 1992). In contrast to parental warmth, parental control did not interact with parental smoking. Although, it may be the case that if the two parenting variables were considered in separate models, an interaction between parental control and parental smoking would have been obtained; however, consistent with the model of authoritative parenting, this study was interested in the *relative* contribution of the main effects of parental warmth and control, as well as the relative contributions of their interactions with parental smoking. Although the current findings need to be replicated, this does suggest that family-based smoking prevention should continue to include general parent-training components given their wide-reaching effects on youth adjustment more generally.

Notable variations between the current and prior studies may account, at least in part, for variability in findings. First, one of the earlier studies (Doherty & Allen, 1994) examined current smoking status of parents,

whereas the present study examined lifetime history of regular use, which some evidence suggests is a more robust marker of adolescent risk (Bauman et al., 1990). In addition, although the prior studies included fathers, the current study is the first in this literature to examine the additive risk associated with having two parents who have a history of regular smoking. The present study also examined specific parenting behaviors associated with authoritativeness, as opposed to more general relationship quality indicators utilized in prior studies. Finally, only one of the earlier studies also controlled for the effect of peer smoking (Foshee & Bauman, 1992), a well-established correlate of adolescent cigarette use. Taking into account the variations in methodology in this literature to date, the current findings suggest that although it is still possible that parenting behaviors conveying warmth and support may buffer children of parents with a lifetime history of smoking against a wide range of other outcomes, its protective function with regard to cigarette use in particular appears to be compromised when one or both parents have a history of regular smoking.

The current findings must be considered in light of the study's limitations. First, given the age of the sample and the limited variability in the adolescent smoking data at earlier assessments, this study relied on measures collected at the final assessment of a longitudinal study. Future research in this area should examine the causal direction of the study variables using a longitudinal design. Additionally, although this data continues to have relevance for furthering our understanding the family context of adolescent smoking, there is a lag between the time that the data was collected (1992–1996) and the current analyses. Accordingly, rates of smoking should be compared with national statistics reported during a similar window and the findings should be replicated with data collected more recently. Related to the aforementioned point, the relatively low rates of both lifetime and current smoking rates for participating adolescents necessitated using a dichotomous measure of lifetime use, precluding the opportunity to examine finer distinctions in adolescent smoking behavior, such as frequency and amount of use. Notably, the lower-than-average youth smoking rates in this study may be due, at least in part, to adolescent concern that parents would become aware of responses to smoking items on the questionnaires; however, parents and children were assured of study confidentiality and each were instructed to complete and mail their questionnaires separately with provided

stamped envelopes. An equally plausible explanation for the lower adolescent smoking rates is the relatively high socioeconomic level of this sample of families. Children of lower socioeconomic status, particularly those from lower-income homes, where parents are less educated, and single-parent homes, are at greater risk of initiating smoking (e.g., Johnston, O'Malley, Bachman, & Schulenberg, 2006; Voorhees, Schreiber, Schumann, Biro, & Crawford, 2002). Related to these risk factors, we statistically controlled for parental education, unemployment, and marital status, as well as family income, in the current study. Until future studies examine nationally representative samples, caution is warranted in generalizing the findings beyond relatively affluent Caucasian families.

A third limitation is that the present study was exclusively questionnaire-based and did not include validation of adolescents' knowledge of their parents' smoking history, biochemical verification of youths' reports of their own smoking behavior, or assessment of adolescents' prenatal exposure to tobacco or the potential neurocognitive effects of such exposure. Replication and extension of this research should include such biochemical and neurocognitive assessments in order to strengthen the confidence in our findings. Fourth, father smoking data were obtained primarily from participating mothers. Our confidence in the accuracy of mother reports is strengthened by research suggesting that spousal-reports and self-reports of health and disability are highly correlated (Brissette, Leventhal, & Leventhal, 2003); however, the lower-than-average rates of smoking among fathers in the sample suggests that mothers may have underreported father smoking data. Similarly, although all participating parents, again primarily mothers, in the study reported on the smoking history of a spouse or partner, we cannot be certain from the wording of the item that single mothers were reporting on the adolescent's biological father. Although re-analysis of the data with the married families yielded a similar pattern of findings, future studies of adolescent smoking should begin to consider the growing number of adolescents being raised by single parents (US Census Bureau, 2005) and the possible range of parental figures who may influence adolescent smoking risk (e.g., parental romantic partners). Finally, this study examined adolescent report, rather than peer report, of peer smoking; however, some work suggests that adolescent report of peer smoking may be the stronger correlate of adolescent smoking (Bauman & Fisher, 1986).

Despite these limitations, several significant strengths merit attention. First, this study examined the main and interactive effects of parental history of regular smoking and authoritative parenting on adolescent self-reported cigarette use. Present findings suggest that studies which consider only the main effects of parent smoking or parenting practices inadequately convey the processes through which families socialize youth to use cigarettes. Second, although the majority of studies in both the family and pediatric psychology literatures have largely failed to include adequate data on fathers [see Phares, Lopez, Fields, Kamboukos, and Duhig (2005) for a review], this study was successful in collecting data on both paternal smoking and paternal parenting behavior. Third, this study examined the transition from 8th to 9th grade, a risky period for adolescent smoking initiation (Brynin, 1999). Fourth, hypotheses were examined after controlling for the well-documented influence of peer smoking, allowing the opportunity to examine the influence of parents over and above that of peers during adolescence. Finally, as previously mentioned, this study examined specific authoritative parenting behaviors, rather than parent-adolescent relationship quality more generally. Accordingly, our findings map onto the literature on authoritative parenting and provide direct implications for family-based smoking prevention and intervention efforts.

Importantly, the current results suggest that family-based smoking prevention programs may optimize their outcomes by focusing on parenting behaviors, specifically parental warmth, and mothers' and fathers' smoking behavior. Although parent-training techniques focusing on enhancing parenting behaviors that convey warmth and support may only have a direct effect on those youth whose parents have never smoked regularly, our findings suggest that such techniques will not have a detrimental effect on the smoking behavior of youth whose parents do smoke. Although beyond the scope of the current study, such parenting strategies may afford indirect protection to the youth of parents with a history of smoking by ameliorating other risk factors which are broadly associated with risk for cigarette smoking (e.g., affiliation with deviant peers, psychosocial adjustment) (Ary et al., 1999; Cornelius, Lynch, Martin, Cornelius, & Duncan, 2001). In addition to authoritative parenting behavior, our findings suggest that family-based smoking prevention programs may be enhanced by targeting parental lifetime history of smoking. As previously noted, recognition of parental history of smoking may qualify the expected

direct effects of intervention modules focusing on parenting behavior, but also such programs may benefit from considering the variety of potential mechanisms by which parents may transmit smoking to their youth, including modeling of current smoking behaviors, as well as prenatal nicotine exposure and transmission of smoking-related values and attitudes (Bricker et al., 2005; Cornelius et al., 2005; Roberts et al., 2005). Although we did not test these mechanisms, our findings suggest that lifetime history of parental regular smoking is associated with risk for youth smoking, particularly when both parents have smoked. Although some mechanisms certainly cannot be ameliorated by family-based adolescent prevention programs, such as prenatal exposure to cigarette smoke, families may benefit from increased education regarding the smoking risk for adolescents exposed to cigarette smoke. Other mechanisms may be targeted more directly, including modeling of current parental smoking (e.g., Bandura, 1977) and parental attitudes regarding smoking behavior and those who smoke (e.g., Bricker et al., 2005; Distefan, Gilpin, Choi, & Pierce, 1998). Finally, given that the adolescents in our study were significantly more likely to have smoked if both of their parents had smoked, family-based prevention and intervention programs should strive to include both parents.

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