DIFFERENTIAL ASSOCIATIONS AND DAILY SMOKING OF ADOLESCENTS
The Importance of Same-Sex Models

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This article examines whether the importance of parents, siblings, best friends, and romantic interests are sex-specific in predicting daily juvenile smoking. Juveniles who smoke daily are strongly influenced by prosmoking attitudes and behaviors of same-sex family members. However, peers remain the most important associations in predicting daily smoking. An important finding is that juveniles without same-sex family role models, or close peers, are at higher risk. Policy implications for prevention and cessation programs are discussed.

Keywords: *juvenile daily smoking; differential association theory; siblings; smoking*

Smoking is consistently identified as the largest cause of preventable disease in our society. Tobacco is responsible for more American deaths than the combination of those due to alcohol, car accidents, homicides, firearms, AIDS, and hard drugs such as heroin and cocaine (Centers for Disease Control and Prevention, 1995). Studies have shown that smoking is prevalent among youth (U.S. Department of Health and Human Services, 1998), that smoking onset typically occurs in early adolescence (U.S. Department of Health and Human Ser-

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vices, 1994), and that the average age of smoking initiation is dropping (Rienzi et al., 1996). Although the existing body of research on juvenile smoking is extensive, the majority of studies examine only initiation or experimentation (Avenevoli & Merikangas, 2003). The goal of many of these studies is to provide useful information for programs designed to prevent juveniles from starting to smoke. However, although many teens may engage in initial smoking, most can be categorized as "experimenters" that do not become regular smokers (Stein, Newcomb, & Bentler, 1996).

In comparison, those who do smoke regularly as juveniles are likely to continue to smoke in adulthood. In fact, most adults who smoke started their habit before the age of 18 (Bricker et al., 2003; Kandal & Logan, 1984). These juvenile smokers suffer various health effects, including increased frequency and severity of respiratory illness and a decreased rate of lung growth and lung function (U.S. Department of Health and Human Services, 1994). This is a serious public health concern because current estimates indicate that daily smoking among juveniles is on the rise (Redmond, 1999; Westphal, Lucey, Brown, & Johnson, 2000) in spite of antismoking campaigns. Therefore, studies that examine youth who report regular or daily smoking may be more informative and important for addressing long-term health issues than studies concerning initiation or experimental smoking.

This study examines how four key differential associations affect smoking behaviors of juveniles: parents, siblings, best friends, and boy- or girlfriends. Although many of these groups have been established to be important predictors of experimental or initial smoking, we focus on their role in predicting daily smoking. In addition, we argue that such groups will have sex-specific influences, with girls and boys being more susceptible to same-sex family models.

SOCIAL LEARNING AND SMOKING

Because smoking is an issue that crosses many disciplines, ranging from genetics and biology to psychology and sociology, there are many theories that have been forwarded regarding the etiology of this phenomenon. One of the most consistently supported theories within

the social sciences is that of social learning. Social learning theory is based on the premise that the process for learning deviant behavior, including smoking, is the same as the process of learning any behavior. Various mechanisms, such as differential reinforcements and cognitive definitions, are involved in this process. However, the primary way individuals learn is in direct interactions with significant others, called differential associations (Akers, Krohn, Lanza-Kaduce, & Radosevish, 1979; Akers & Lee, 1996; Burgess & Akers, 1966). It is from these associations that the individual learns the attitudes as well as the actual skills, or necessary types of processes, to engage in deviant acts. When those one associates with have favorable attitudes or definitions toward an action, the individual is more likely to engage in the behavior. Similarly, if the associates engage in deviant acts, they serve as models that the juvenile can imitate.

Social learning variables that are most consistently linked to smoking are the attitudes and behaviors of various differential associations. If parents, siblings, and friends provide definitions that are favorable to smoking, or if they serve as pro-deviant role models by smoking themselves, the juvenile is considered at much higher risk to initiate smoking.

Parents often are considered the primary source of social learning so many studies have examined the role of parents on juvenile smoking patterns. In a recent review of 121 published papers that examined the link between juvenile smoking and family smoking, Avenevoli and Merikangas (2003) found the effects of parental smoking are generally small, even when statistically significant (p. 12). Therefore, although parents who smoke are found to provide models for smoking initiation (Brook, Whiteman, Czeisler, Shapiro, & Cohen, 1997; Chassin, Presson, Rose, & Sherman, 1996; Engels & Knibbe, 1999; Flay, Hu, Siddiqui, & Edward, 1994; Pederson, Baskerville, & Lefcoe, 1984), the magnitude and significance of the effect can depend on the types of measures used, the sex of the parent studied, and what other controls are included in the models (see Avenevoli & Merikangas, 2003, for extended review).

A second important family influence is the juvenile's older siblings. This form of association has been relatively neglected in the smoking literature. However, when older siblings are included in analyses, the findings are "more consistent than findings for parental

influences" (Avenevoli & Merikangas, 2003, p. 13). The few existing studies that include siblings in analyses conclude that smoking by these role models increases both experimentation and regular smoking among younger siblings (Chassin, Presson, Sherman, Corty, & Olshavsky, 1984; Miller & Volk, 2002). Therefore, it is important to improve our understanding of the role of siblings on adolescent smoking.

Although family members serve as the earliest models for both smoking behaviors and attitudes toward smoking, powerful sources of social learning among juveniles are their peers. Peer influences have consistently been the strongest predictor of smoking initiation and experimentation by providing models of smoking behavior as well as increased opportunities and reinforcement for smoking (Brook et al., 1997; Chassin, Presson, Sherman, Montello, & McGrew, 1986; Flay et al., 1994; Pederson et al., 1984; Urberg, Degirmenciogle, & Pilgrim, 1997).

According to social learning theory, associations that began at earlier ages, that are more frequent, that have longer duration, and that are more intense or important to the juvenile will have the greatest impact on behavior (Sutherland, 1939). For juveniles, one of the most important relationships is the "best friend." Therefore, most studies examining peer influences on smoking focus on respondents' reports about the attitudes and behaviors of their best friends (Chassin et al., 1986; Flay et al., 1994; Kobus, 2003; Wang, Fitzhugh, Westerfield, & Eddy, 1995). A review of this literature indicates that best friends share many of the same smoking-related behaviors and attitudes and that best friends are the best predictor of smoking (Kobus, 2003).

One final type of association that may influence the behaviors of an adolescent is her or his romantic interest. Although such relationships may not be maintained over a long duration, they are very important in the lives of teenagers. In fact, it is fairly common for juveniles to engage in imprudent activities, such as smoking, to produce a specific image that they feel will attract their romantic interest (Kobus, 2003, pp. 45-46). Therefore, the smoking behavior and attitudes toward smoking of a romantic interest could substantially influence whether a juvenile begins to smoke. However, very few studies have incorporated this type of differential association in analyses. In fact, one of the recommendations for future research on juvenile smoking, based on

an extensive review of studies on peer influences by Kobus (2003, p. 52), is to examine the role of romantic relationships on tobacco use.

One important contribution of the current study is to examine the role of all four of these major differential associations identified as important in separate studies. Instead of only examining parents or best friends, we also include the role of siblings and the respondents' girl- or boyfriends on daily smoking. In addition, we examine whether the sex of the juvenile and the sex of the differential association influence daily smoking patterns.

PROGRESSION TO DAILY SMOKING

Along with associations, another important element of social learning theory is the reinforcement the individual receives from the behavior. These can be social reinforcements, in which associates reward or punish the behavior, or more direct reinforcements, such as negative physical reactions to the behavior. In the case of smoking, this could include the physical response of coughing or feeling ill when first experimenting with smoking. Therefore, it is possible that whereas associations may be vital in the initiation of smoking, other forms of social learning processes determine whether the juvenile continues to smoke. Such a possibility is supported by the finding that prosmoking attitudes and behaviors of family members appear to be "more important to the initiation of smoking than to the later transition from experimental to habitual smoking" (Chassin et al., 1984, p. 239). Thus, once the juvenile has tried smoking, continued prosmoking associations are potentially not important in predicting escalated levels of smoking.

However, social learning is not simply a one-way process that ends once the attitudes or skills are learned. In fact, Akers and Lee (1996) find that learning is sequential, with social learning variables or peer and family influences continuing to affect juvenile smoking behavior across time. Once smoking, or any type of deviance, has been initiated, the juvenile is likely to seek out others that are involved in similar deviant behaviors. Such an interactive process of social learning allows the juvenile to continue to receive positive reinforcements for their participation in smoking. This may lead juveniles to associate with peers who are also smokers and abandon former nonsmoking

friends. Associating with other smokers provides additional opportunities for the juvenile to smoke, may provide positive social reinforcement of the activity, or at least helps the smoker avoid negative reactions from nonsmoking associations.

Because family members are not a type of association that the individual may chose and then easily abandon if the definitions of the juvenile and family members come into conflict, the influences of family are considered to be more limited to the transition between never smoking and experimentation or initiation of smoking. However, some studies have found continued impacts of family members on the progression to more regular smoking among juveniles (Flay et al., 1994). It is thus important to examine whether the sex-specific patterns emerge when examining the risk of progressing from lower levels of smoking to daily smoking.

Therefore, the second aim of this study is to examine whether differential associations influence smoking at different stages of daily smoking acquisition. In the first comparison, daily smokers are contrasted to juveniles who have never smoked. In this case, it is expected that associations with favorable definitions toward smoking or who model smoking behaviors will have dramatic influences on increasing the risk of daily smoking. The second comparison determines whether these associations continue to add to the social learning process by contrasting daily smokers with those who have at least tried cigarettes but who smoke less than daily.

SEX DIFFERENCES IN SMOKING PREDICTORS

Although social learning variables often significantly predict smoking initiation or experimentation for juveniles, there remains some question about whether these effects vary for boys and girls. Do the models provided by parents, siblings, and peers affect juveniles equally or are there differences based on the sex of the model or the sex of the juvenile?

Although family and peers generally predict smoking for both sexes, several researchers have found that girls are more susceptible to family and peer influences than are boys (Chassin et al., 1984, 1986). For example, in studies when parental smoking is only significant for

one sex of juveniles, it is most often the girls (Chassin et al., 1986; Clayton, 1991). A review of psychosocial influences in juvenile smoking reveals that the influence of parents' smoking depends somewhat on the sex of the parent (Clayton, 1991). There is also some evidence that maternal smoking may be more important in predicting the adolescents' smoking than paternal smoking, but in general such findings are inconsistent (Avenevoli & Merikangas, 2003). Due to these mixed results, several authors have concluded that testing "whether mothers and fathers differentially influence boys and girls" would be useful (Chassin, Presson, Rose, & Sherman, 1998, p. 215).

The effect of older siblings and peers also may vary by the sex of the juvenile. Chassin et al. (1984) found that sibling smoking is a predictor of initiation to smoking for girls but not boys, and one recent study finds there are closer patterns of smoking between sisters than other sibling pairings (Wang et al., 1995). Thus, the influence of siblings on adolescent smoking behaviors and attitudes may be dependent on the sex of the siblings involved. Peers seem to uniformly affect both boys and girls (Clayton, 1991), but the relative importance of peers shifts during different periods in the lives of boys and girls (Chassin et al., 1986). The type of peer relationship also can have different effects depending on the sex of the juvenile. For example, Akers et al. (1979) found that boyfriends' smoking has a greater affect on girls smoking than the smoking behavior of girlfriends on boys' smoking. These findings indicate that much remains unclear about the relative importance of the sex of differential associations on boys' and girls' smoking.

The primary goal of this project is to determine if the importance of associations are sex specific. Same-sex family pairings are expected to have more influence on juvenile smoking. Boys are more likely to view father figures or older brothers as appropriate role models rather than mothers or older sisters, and vice versa for girls. We hypothesize that the influence of differential associations on daily juvenile smoking will be dependent on the sex of the juvenile in relation to the family member. In addition, based on past studies, we also expect that the importance of peers will vary by the sex of the adolescent, with girls being more influenced by romantic interests and best friends than are boys.

DATA AND METHODS

The data for the current study are drawn from surveys conducted with 7th-, 8th-, 11th-, and 12th-grade students in Tucson, Arizona, in 1996 and 2000. The surveys were part of the Full Court Press Project (FCPP), a comprehensive evaluation of a community-wide intervention to reduce tobacco use among youth in Tucson (Lee et al., 2002). The sampling frame for the survey included all middle and high schools, both private and public, within the city limits that had 35 or more students enrolled in each grade. A total of 23 middle and 15 high schools participated in 1996 and 23 middle and 16 high schools participated in 2000. The school participation rates were 92.7% in 1996 and 95.1% in 2000. Up to 350 students within each school were sampled by selecting a class period in which the survey was administered. Selected class periods were ones in which all students in the selected grades were required to be enrolled and therefore were most likely to be present for the questionnaire administration. For schools with a small number of students, the survey was administered at a school assembly.

A total of 7,725 students were surveyed in 1996 and 7,404 students in 2000. Overall, the sample is well balanced in regard to gender and also reflects the overall gender breakdown of the population in the city in which the surveys were conducted. (For detailed sample description as well as additional analysis for sample comparability, see Lee et al., 2002.) Additional data analyses demonstrated that the 1996 and 2000 samples were comparable in terms of key personal and behavioral variables. Specifically, there was no significant difference between the two samples in terms of absenteeism, educational aspirations, drinking, rebelliousness, and family conflict (Lee et al., 2002).

DAILY SMOKERS

Developing a definition of "smoker" is difficult for the age group under consideration. Some studies have used very inclusive criteria such as self-reported identification as a "regular smoker" (Chassin et al., 1984) or simply having smoked at least once in the past 30 days (Centers for Disease Control and Prevention, 2002). However, such measures very likely include juveniles who have only experimented

with smoking and who will not develop into regular smokers as adults or even as juveniles. Because the interest of the current project is on juveniles who are more likely to become lifetime smokers, we focus on respondents who have smoked at least 100 cigarettes (approximately 5 packs) in their lifetime and who report smoking at least one cigarette each day. Because daily smoking is a relatively rare event for this age group, logistic regression is used in two series of analyses.

Daily smokers are compared first to juveniles who have never tried smoking, not even "a few puffs." This will provide the most extreme comparison possible in the sample. The second comparison is between daily smokers and those who do smoke, but not as regularly. Those who fall into this category range from those that report they have smoked a cigarette "just to try" to those who report that they smoke no more than one cigarette per week.

FAMILY AND PEER INFLUENCES

Because families and peers are consistently found to be crucial in studies of smoking initiation, these groups are the focus of this investigation predicting daily smoking. The FCPP includes information on both the attitudes about smoking and the actual smoking practices of key significant others to the respondent. Respondents are asked how important staying off cigarettes is in the opinion of various people. Specifically, respondents report on their perceptions of the opinions of their mother (or stepmother), father (or stepfather), older brother, older sister, best friend, and "your steady girlfriend/boyfriend." The information regarding the respondents' girlfriend or boyfriend was not explicitly limited to heterosexual relationships because this is one item and the sex of the significant other is not specifically indicated. Categories for the opinions of these associations range from *very important* to *not important at all*, with an additional response category of *no such person*. Data on the smoking behaviors of these same groups also were collected. Respondents reported whether each type of person is a *current smoker*, a *former smoker*, or whether the person has *never been a smoker*. Two final responses are that the respondent does not know the smoking status of the person or does not have such a person.

Because we are interested in determining the impact of strong antismoking associations as role models, we code both of these types of variables as series of dummy variables using the strongest antismoking coding as the left-out categories in the analyses. To minimize collinearity problems, respondents who report not having such a person for either the opinion or smoking status questions, or not knowing the smoking status of the person (indicating that they do not have enough contact for that person to serve as an important role model), are combined into one variable of "no such model." Respondents' perceptions of the opinions of their associations are grouped into two variables. The first indicates that the association believes staying off cigarettes is *very important*, and the second indicates that the person provides less clear antismoking messages, with the respondent indicating that the person thinks this issue is only *somewhat important*, *not too important*, or *not important at all*. The behavioral measures are separated into three distinct groups: *current smoker*, *former smoker*, and *never smoker* (left-out category).

FINDINGS

From the entire sample of 15,129 students surveyed in 1996 and 2000, 1,403 juveniles fit the criteria for daily smokers in these data. Table 1 provides basic demographic information for the daily smokers. Girls are less likely to be classified as daily smokers than are boys, consisting of 46% of this group. Only 215 daily smokers (15% of the total) are in middle school, indicating that most daily smokers are older juveniles. The sample is 53% White, with Hispanic being the largest minority group, representing 24% of the sample of daily smokers. One possible limitation of these data is the ability to generalize to the larger juvenile population due to the larger percentage of juveniles in Hispanic groups. However, unlike other studies that often ignore this ethnic group or classify them as an "other" category, the number of Hispanics in these data allows us to specifically examine whether these juveniles are at higher or lower risk for regular smoking.

The majority of existing work that includes relevant comparisons demonstrates that Hispanic youth have higher rates of smoking than other racial and ethnic groups (Gritz et al., 2003; Unger et al., 2001)

TABLE 1
Characteristics of Daily Smokers in the Full Court Press Project

	Frequency	*Percentage*
Male	705	50
Female	642	46
Middle school	215	15
High school	356	68
White	737	53
Hispanic	336	24
Other	170	12

NOTE: Percentages are based on the full sample of 1,403 daily smokers. Percentages do not add to 100 due to rounding and missing data for particular characteristics.

and are most similar in smoking patterns to Whites (Ellickson, Perlman, & Klein, 2003). Examinations of predictors of juvenile smoking focus on differences in social influences on smoking between Hispanics and other groups. For example, Unger et al. (2001) argue that past findings indicate that peer influences are less important for Hispanics. However, they also hypothesize that the cultural bond that exists between parents and children in Hispanic families leads parents to play a more sustained role in juvenile smoking patterns than other racial groups, thus minimizing the potential influence of peers. In their study, they find support for this hypothesis with several ethnic groups, including Hispanics, being less influenced by friends' smoking than White youth. In other work, although different from African American and Asian American youth, family prosmoking influences for Hispanics are similar to White youth (Ellickson et al., 2003). In contrast, Gritz et al. (2003) find very little difference in peer influences between Hispanics and other racial groups. Therefore, past findings on predictors of Hispanic juvenile smoking are inconsistent.

In contrast to past work, Hispanics have a substantially lower percentage classified as daily smokers than Whites or other racial groups in the current study. Specifically, only 11% of Hispanics in the full sample are daily smokers, compared to 28% of Whites and 21% of the "other race" category. This may indicate that the finding of higher rates of smoking among Hispanics in previous studies is limited to experimental smoking. The current study also found some demographic differences between Hispanic daily smokers and other ethnic groups. Compared to Whites, Hispanic daily smokers were less likely to come

from intact homes (37% vs. 42%), were more likely to be in middle school (22% vs. 15%), and were more heavily male than all other racial groups (60% compared to 48% Whites and 53% other).

To determine whether there are sex differences in the importance of differential associations on daily juvenile smoking, two series of logistic regression analyses are conducted separately for girls and boys. The first series provides a comparison between daily smokers and juveniles in the sample who have never tried smoking. The second series examines the role of differential associations on the risk of daily smoking compared to less frequent smoking. To assess the relative importance of family members and peers, two models for each sex are run. The first includes only the family variables and the second adds in the variables associated with the attitudes and smoking status of the respondents' best friend and any steady girlfriend or boyfriend.

DAILY SMOKERS VERSUS NONSMOKERS

Table 2 provides the results of the analysis comparing daily smokers to those who have never tried a cigarette. These results clearly demonstrate the importance of family and peers. In the first model, race and age are significant for both boys and girls. Hispanics are less likely than Whites to be daily smokers for both sexes, but this effect is more substantial for the girls. The odds of a Hispanic boy being a daily smoker are 30% less than Whites. For girls, the difference is more than double that, with the odds for a Hispanic girl being a daily smoker being 61% less than a White girl. Girls in other ethnic groups are also at less risk than are Whites for daily smoking (OR = 0.67). In addition, those who are in middle school are at substantially less risk to be daily smokers than are those in high school (ORs = 0.24 for boys and 0.21 for girls).

Important sex differences emerge when examining the role of parents and older siblings. Although mothers have a dramatic impact on girls, none of the variables associated with mothers are significant in the model for boys. In comparison to having a mother who has never been a smoker, girls with mothers who are currently smoking or who were former smokers are at higher risk for daily smoking. In fact, the odds for becoming a daily smoker by more than 200% if the girl has a mother who is a current smoker. In addition, not having a mother role

TABLE 2
Logistic Regression on Juveniles Who Smoke Daily Compared to Juveniles Who Have Never Smoked: Family and Peer Impacts

	Boys		*Girls*	
	Model 1 Exp (B)	*Model 2 Exp (B)*	*Model 1 Exp (B)*	*Model 2 Exp (B)*
Control variables				
Hispanic	0.70**	0.06***	0.39***	0.48***
Other ethnicity	0.91	1.02	0.67*	0.72
Middle school	0.24***	0.29***	0.21***	0.27***
Attitudes and behaviors				
Mom				
No such model	0.64	0.66	1.80*	1.27
Not very important	1.24	1.24	1.29	1.07
Current smoker	1.34	1.19	3.07***	2.08***
Former smoker	1.12	0.93	1.79***	1.52*
Dad				
No such model	1.98***	2.20***	1.19	1.24
Not very important	1.23	1.08	1.13	1.19
Current smoker	2.10***	1.81**	1.30	1.14
Former smoker	1.81***	2.05***	1.11	1.06
Older brother				
No such model	1.90***	1.79**	1.11	1.02
Not very important	1.55**	1.64*	1.48*	1.26
Current smoker	3.87***	1.71*	1.42	0.98
Former smoker	3.25***	2.37**	1.72*	1.16
Older sister				
No such model	1.47**	1.23	1.76***	1.68*
Not very important	1.80***	1.24	1.80***	2.09***
Current smoker	2.20***	0.95	3.43***	1.86*
Former smoker	3.24***	2.21**	3.63***	1.99*
Best friend				
No such model		1.10		2.01**
Not very important		1.67**		1.82***
Current smoker		15.37***		15.25***
Former smoker		3.99***		3.10***
Steady boy- or girlfriend				
No such model		0.93		1.32
Not very important		2.37***		1.31
Current smoker		4.25***		8.94***
Former smoker		1.80*		2.79***
N	3,241	3,185	3,538	3,493
Nagelkerke R^2	.27	.56	.30	.61

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

model also serves to increase the odds of daily smoking in girls by nearly 80%. Similarly, daily smoking of boys is predicted by the smoking status of a father, but fathers have no significant impact on girls. For boys, having a father who is a current or former smoker serves to increase the odds of moving from never smoking to daily smoking. In addition, if the boy does not have a father figure, the odds of progressing from never having smoked to daily smoking increases by 98%. Thus, prosmoking same-sex parental models and the lack of a same-sex parent significantly increase the risk of daily smoking compared to nonsmoking in juveniles.

Although there is also some indication of a same-sex impact when examining the role of older siblings, this is a much less clear pattern. In Model 1 for boys, every variable related to older siblings is significant. This indicates that compared to having older siblings that have a clear antismoking attitude or who do not smoke, other types of messages from both older brothers and older sisters increase the risk of daily smoking for boys. For example, in comparison to having an older brother who does not smoke, such a sibling who is a current smoker increases the odds of daily smoking by 287%. Although the magnitude of the effect is less than half that associated with older brothers, a currently smoking older sister increases the odds of daily smoking by 120%. Thus, boys appear to be particularly susceptible to older sibling influences.

Although girls are also significantly influenced by both sexes of older siblings, having an older brother with prosmoking behaviors or attitudes is less important than having an older sister with similar attitudes or behaviors. Only two of the variables are significant for older brothers in the model for girls. Compared to girls with older brothers who think it is very important to stay off cigarettes, girls with brothers who are more lenient in their attitudes are at 48% greater odds of becoming daily smokers. In comparison, older sisters' opinions about smoking have nearly double the impact. The odds of a girl becoming a daily smoker increases 80% if the older sister does not think it is important to stay off cigarettes. Similarly, although the odds of girls becoming daily smokers increases if an older brother is a former smoker (OR = 1.72), the smoking status of an older sister is of much higher magnitude. In comparison with girls whose older sisters have never smoked, having an older sister who is a current or former smoker in-

crease the odds of daily smoking by 243% and 263%, respectively. Thus, although not as distinct as same-sex parental models, it does appear that siblings also have different impacts depending on whether the sibling is of the same sex as the juvenile.

Because several studies have failed to find family effects when other variables, such as peer smoking, are added to the analyses (Avenevoli & Merikangas, 2003), a second model is run to examine the risks of moving from never having smoked to daily smoking for each sex. Model 2 continues to include the role of both parents and siblings and adds two important peers: the best friend and any steady boy- or girlfriend. Although the fit of the models with only family associations was good (Nagelkerke R^2 of .27 for boys and .30 for girls), adding these peer associations substantially improves the overall fit of the models (Nagelkerke R^2 of .56 for boys and .61 for girls). Hence, as is found in previous research, it is clearly important to consider the role of peer attitudes and smoking behaviors in predicting juvenile smoking.

As in Model 1, race and age are still significant predictors for both boys and girls, with Hispanics and younger juveniles at less risk of being daily smokers. In addition, the sex-specific pattern appears to be very little changed. For boys, none of the variables related to mothers' smoking are significant. Fathers who are currently smoking, who were former smokers, or not having a father figure all increase the risk of daily smoking for boys. In contrast, the attitudes and behaviors of fathers are never significant for girls in this model, but having a mother who is a current or former smoker remains significant a risk for daily smoking. The role of siblings in these models becomes even more sex specific when the influences of peers are controlled. The attitudes and behaviors of older brothers are all significant for boys, but none reach statistical significance for predicting girls' daily smoking. Similarly, the importance of older sisters in boys' lives is substantially reduced compared to the model with just family associations. Although all four of the variables for older sisters were significant before accounting for the role of peers, in Model 2, the only significant impact is having a sister who is a former smoker. Having a formerly smoking sister increases the odds of daily smoking by 121% compared to boys with older sisters who have never smoked. However, older sisters continue to exert consistently strong influences on youn-

ger sisters. Therefore, even when we control for the role of peers, same-sex role models within the family continue to play a major role in the smoking behaviors of juveniles.

Peers, however, clearly have the greatest effects on both boys and girls. Juveniles who report that their best friend is a current smoker are dramatically more likely to become a daily smoker rather than to continue to be a nonsmoker. In fact, the odds for daily smoking for both boys and girls are more than 1400% higher for those with a best friend who is a current smoker than for those with a best friend who has never smoked. Clearly, best friends continue to be of great importance to predicting, and preventing, smoking among juveniles. However, we also need to look more closely at the role played by romantic interests.

Several of the variables related to romantic associations are significant risk factors for both boys' and girls' daily smoking. Boys with a steady significant other who do not have strong antismoking attitudes are at higher risk for daily smoking (OR = 2.37), and if the partner is a current or former smoker, the risk of the boy being a daily smoker also increases. Although girls are not significantly affected by the attitudes of their romantic interests, they do appear to be even more susceptible to the actual smoking behaviors than are boys. Girls who indicate their steady partner is a former smoker are at 179% greater odds to smoke daily as compared to only 80% greater odds for boys. In addition, the odds of girls becoming a daily smoker as opposed to never smoking are raised by nearly 800% (OR = 8.94) if their partner is a current smoker. This is double the odds increase for boys with currently smoking partners (OR = 4.25). Therefore, although both sexes are influenced by romantic interests, there is some indication that such associations have greater influence over girls.

DAILY SMOKERS VERSUS LESS REGULAR SMOKERS

Similar to the comparison between respondents who had never smoked and daily smokers, two sets of models were run comparing daily smokers with less regular juvenile smokers. Model 1 examines only the impacts of families and Model 2 adds the impacts of best friends and romantic interests (see Table 3). Because the dependent variable is indicating a more subtle change in behavior, from juveniles who smoke but less than every day to those who do smoke daily, the

TABLE 3
Logistic Regression on Juveniles Who Smoke Daily Compared to Juveniles Who Smoke Less Regularly: Family and Peer Impacts

	Boys		*Girls*	
	Model 1 Exp (B)	*Model 2 Exp (B)*	*Model 1 Exp (B)*	*Model 2 Exp (B)*
Control variables				
Hispanic	0.50***	0.53***	0.29***	0.33***
Other ethnicity	0.76	0.88	0.71*	0.75
Middle school	0.36***	0.38***	0.24***	0.36***
Attitudes and behaviors				
Mom				
No such model	0.74	0.82	1.16	0.92
Not very important	1.04	1.02	1.17	1.10
Current smoker	1.56**	1.40*	1.96***	1.72***
Former smoker	1.11	0.98	1.33*	1.30
Dad				
No such model	1.65**	1.75**	1.29	1.36
Not very important	1.01	0.93	1.05	1.09
Current smoker	1.64***	1.30	1.16	1.53
Former smoker	1.55**	1.47*	1.04	1.03
Older brother				
No such model	1.59*	1.50*	0.98	0.73
Not very important	1.16	1.35	1.05	0.90
Current smoker	2.59***	1.73**	1.34	1.02
Former smoker	2.12***	1.45	1.55	1.28
Older sister				
No such model	1.23	1.02	1.45*	1.28
Not very important	1.27	1.06	1.49*	1.50*
Current smoker	1.74**	1.13	2.21***	1.52*
Former smoker	2.00***	1.86**	1.72*	1.27
Best friend				
No such model		1.13		1.52
Not very important		1.18		1.37*
Current smoker		5.73***		6.01***
Former smoker		2.06***		2.04***
Steady boy- or girlfriend				
No such model		0.95		1.97***
Not very important		1.40*		1.35
Current smoker		3.84***		5.53***
Former smoker		2.01***		2.22***
N	2,898	2,863	3,077	3,047
Nagelkerke R^2	.15	.35	.18	.40

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

effects of both peers and family members are less dramatic than the transitions between never smokers and daily smokers. However, similar patterns of same-sex importance emerge and there is evidence that both prosmoking family and peer associations continue to generate greater risk for daily smoking even after the juvenile has initiated smoking.

In the first model controlling for family influences only, boys are again more influenced by male family models, such as their father figure and older brothers, but are also somewhat affected by mothers and older sisters. Mothers who are current smokers increase the odds of moving from less regular to daily smoking by 56%, and older sisters who are current and former smokers also increase the risks of daily smoking among boys. However, the more consistent impacts are from same-sex family models. Not having a father figure or an older brother both increase the risk of boys transitioning to daily smoking (ORs = 1.65 and 1.59, respectively). A father or older brother who is a current or former smoker also increase the odds of boys moving to daily smoking by between 55% and 159%, with the greatest impact coming from currently smoking older brothers. In comparison, the risk of girls moving from less regular to daily smoking is only influenced by same-sex family models. Having a mother who is a current or former smoker both increase the risk of daily smoking among girls. Older sisters appear to be even more influential because all four measures related to this group significantly increase the risk of daily smoking among girls. Again, for both sexes, younger juveniles are at less risk for moving from experimental to daily smoking as are Hispanics. The odds of moving from experimental smoking to becoming a daily smoker is 50% less for Hispanic boys and more than 70% less for Hispanic girls than for White juveniles. This indicates that whereas Hispanics in this sample may experiment with smoking, they are much less likely to become daily smokers than are White adolescents.

Adding in the effects of peers in Model 2 does not substantially alter the patterns of same-sex family models. Boys are still affected by all family members, with same-sex models being somewhat more consistent risk factors, and girls are only significantly influenced by female models. Similar to the models comparing never smoking to daily smoking juveniles, peers in the form of best friends and romantic

interests are substantially more important than family members in predicting the transition from some smoking to daily smoking.

Having a best friend as a current smoker increases the odds of daily smoking by 473% for boys and just over 500% for girls. Thus, although this is less of an increase than the transition from never smoking, best friends continue to serve as important associations for increased smoking among juveniles, not just as models for initiation into smoking. Similarly, having a romantic interest who smokes is again more important for girls than for boys. Although such a person increases the odds of daily smoking for boys by 284%, a smoking significant other increases the odds of daily smoking for girls by 453%, again nearly double the impact compared to that exerted by boys' romantic interests. Girls also are more likely to be daily smokers if they are without a steady romance, but not having this form of relationship is not a significant risk for boys.

CONCLUSION

This study establishes the importance of differential associations in the transition to juvenile daily smoking while examining whether these associations exert sex-specific influences. Unlike past work, the inclusion of siblings and romantic interests along with the more commonly studied parental and friend relationships provides a more complete understanding of the importance of differential associations. In addition, by performing separate analyses for each sex, we demonstrate that differential associations have sex-specific effects on juvenile smoking. Although many studies find differential associations contribute to experimentation and initiation of smoking, this study moves beyond past work and examines how such groups put the juvenile at risk for daily smoking. Not only are families and peers important in comparisons between those who have never smoked and juveniles who smoke daily but the importance of these associations does not disappear after the juvenile initiates smoking. Even juveniles who have tried smoking, and some who smoke fairly regularly for their age range, are still at greater risk for moving into the final step of daily smoking if their family and peer associations provide prosmoking definitions and models.

Consistent with past studies, parental attitudes and behaviors have substantial impacts on juvenile smoking. However, this study provides two unique insights into the role of the family for juvenile smoking. First, the finding that older siblings' prosmoking attitudes and behaviors significantly increase the likelihood of daily smoking indicates that this is a crucial area of research that has been seriously neglected. Second, social influences are highly sex specific. Girls are influenced consistently by mothers and older sisters, whereas boys are most likely to be influenced by fathers and older brothers. However, boys are also somewhat influenced by mothers and older sisters. This may indicate that girls are more likely to look exclusively to same-sex role models for cues about acceptable behaviors than are boys. In comparison, boys may view female family members as role models. This could be linked to the reality that mothers are typically the primary caregiver for both boys and girls. Therefore, children of both sexes identify with the mother in early stages of development (Chodorow, 1978). In addition, in current society, 23% of all children live in single mother households (Fields, 2001). Hence, due to lack of other parental models, many boys may look to mothers as models for behavior.

Although parents and older siblings remain significant contributors to daily smoking, close peers who hold prosmoking definitions and provide smoking models to imitate contribute the most substantial risk. Having a best friend or romantic interest that is not opposed to smoking may increase the risk of daily smoking for several reasons. First, they may simply make it easier to smoke by being a source of cigarettes. Not only may these peers provide opportunities to smoke but smoking would not be a source of conflict or tension in the relationship if both of the individuals smoke. Thus, juveniles may not directly change their smoking to match that of a best friend or romantic interest but may actually seek out those with similar smoking behaviors. On the other hand, juveniles who want to maintain a relationship with a specific peer who smokes may feel the need to change their own behavior to match the smoking level of the association.

Although the influence of best friends does not differ by the sex of the juvenile, the sex-specific impacts of romantic interests on juvenile smoking patterns deserve further attention. In this study, girls are particularly susceptible to the smoking patterns of a steady romantic part-

ner. Girls may feel more pressure to engage in deviant behaviors such as smoking to conform to the expectations of a romantic interest.

Although differential association theory typically focuses on the importance of significant others, one finding in the current study is that lack of specific associations also can increase problem behavior. For both sexes, not having same-sex parental or older sibling models increases the risk of daily smoking in many of the models. In fact, not having a father figure often exerts a more substantial impact on the likelihood of daily smoking for boys than having such a model who exhibits prosmoking behaviors or attitudes. Social isolation indicated by the absence of specific peers also can increase the risk of juvenile daily smoking. However, this affect is specific to girls. Girls who report they do not have a best friend are at greater risk for moving from never smoking to daily smoking, and girls without a romantic partner are significantly more likely to transition between some smoking and daily smoking. Therefore, not having specific associations in itself is a risk for higher smoking among juveniles.

This study suggests several new avenues for juvenile antismoking and smoking cessation programs. Past programs that focused on health consequences of tobacco use in an effort to scare juveniles from initiation of smoking have been largely ineffective (Jacobson et al., 2001; Sussman, Dent, Burton, Stacy, & Flay, 1995). Current trends in community-based programs have been to target advertising and further restrict youth access to tobacco (Jacobson et al., 2001). However, most programs continue to be based in schools and focus on resisting social influences. Such programs teach resistance to peer pressure by practicing refusals through role playing, help youth identify high-risk settings for tobacco exposure, and provide them with strategies to withdraw from such situations (Jacobson et al., 2001; Sussman et al., 1995). Although such social influence programs have shown some success in delaying tobacco use (Tobler, 1986), such effects are limited either in the duration (Ellickson, Bell, & McGuigan, 1993; Murray, Pirie, Luepker, & Pallonen, 1989) or the magnitude of their impact (Peterson, Kealey, Mann, Marek, & Sarason, 2000). The current study suggests that these programs may be missing several key elements.

Many school-based programs that target juvenile smoking focus primarily on dealing with peer influences without much attention

given to the family environment. This approach is based on the assumption that peer influences are more important than family influences. Our data, however, show that parental and sibling influences are sizable even when controlling for peer influence. Moreover, the importance of same-sex parents and siblings suggest that social learning plays a vital role in the progression to becoming a regular smoker. Therefore, this study suggests the need to incorporate the family into any antismoking program.

Strategies to address the influence by parents and siblings would be substantially different from those that focus on peer influences. Encouraging juveniles to avoid social situations that are high risk for smoking and working to enhance resistance to peer pressure are not adequate to assist juveniles if their parents and siblings smoke. Therefore, at the least, the scripts provided to juveniles to avoid peers who smoke would need to be modified to address siblings and parents. However, a potentially more effective program suggested by the findings of this study would target same-sex family members, bringing together older siblings and parents to discuss the role they play as models for adolescents.

Sussman et al. (1995, pp. 46-47) suggest that effective countersmoking programs would work to build mutual areas of interest with peers that do not include smoking. Such an approach also may be effective working with older same-sex siblings. Instead of yet another antismoking lecture, getting siblings together in activities that are interesting and challenging, and that preclude tobacco use, would give the siblings a shared activity and interest, building a stronger positive sibling relationship. For example, programs could work with sibling pairs to help them learn a new sport such as martial arts, have them compete with other sibling pairs in a race, or introduce the siblings to a new hobby. Part of the program would provide information to the older sibling regarding how their attitudes and behaviors can have a profound impact on their younger sibling. Emphasizing how their younger siblings are already at risk may encourage the older juvenile to modify their own activities and attitudes, at least in the presence of their impressionable sibling. Because this study also finds that the lack of an older same-sex sibling is itself a risk for increased smoking, programs should pair juveniles with an older same-sex role model.

Use of big brothers/big sisters organizations, or pairing juveniles with older same-sex peer mentors at school, may provide additional antismoking messages that could serve to counter any prosmoking messages the juvenile may receive from their parents or other peers.

In addition, our study indicates that it is vital to work with juveniles who have already initiated smoking to prevent them from becoming regular smokers. Most programs target to experimental or initial smoking to prevent juveniles from ever taking their first drag on a cigarette. However, our study shows clearly that even after initiation, social groups continue to play an important role in escalated levels of smoking. Therefore, continuing to provide antismoking definitions to counter the ongoing favorable definitions the juvenile is receiving from family and friends is vital. This indicates a need for booster programs that reemphasize for siblings and parents their influence in the juveniles' smoking. These programs should not be limited to schools but should move into the home setting through the use of challenges or homework that requires assistance from family members.

Although this study does find support for the hypothesis that the effects of differential associations are sex-specific, there are important limitations. First, because this is cross-sectional data, it is unknown if the juvenile started smoking prior to the development of their current friendship networks or before entering into their current romantic relationship. Therefore, it is possible that the importance of peers with prosmoking attitudes and behaviors is an effect of a type of selection bias. If juveniles begin smoking and then seek out similar peers, their own behavior may determine the smoking attitude and behavior of their friends. Whether juveniles change best friends or romantic interests after they begin smoking or after they become daily smokers are potentially important topics for future studies.

In addition, other family members may serve as important models for smoking. For example, younger siblings, multiple older siblings, and additional adults such as grandparents or cohabiting partners may all provide pro-or antismoking definitions to the juvenile. However, these types of associations are not included in these surveys. Future studies should consider these types of associations to determine whether other types of family members contribute to daily smoking in juveniles.

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