Differential Influence of Parental Smoking and Friends' Smoking on Adolescent Initiation and Escalation of Smoking*

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Smoking-related behaviors and attitudes of significant others (especially friends and parents) are among the most consistent predictors of adolescent smoking. However, theorists remain divided on whether the behaviors of significant others influence adolescent smoking directly or indirectly, and the relative influence of parental and peer smoking on adolescents’ own smoking is still a matter of debate. In addition, little research has examined the role of significant others’ behavior on different stages of smoking onset. In particular, not much information is available regarding gender and ethnic differences in social influences on smoking behavior. We use structural equation modeling to address these issues. Different theoretical perspectives from cognitive-affective theories (Ajzen 1985; Ajzen and Fishbein 1980) and social learning theories (Akers et al. 1979; Bandura 1969, 1982, 1986) have been integrated into a structural model of smoking influence. The results show that friends’ smoking affects adolescent initiation into smoking both directly and indirectly, whereas parental smoking influences smoking initiation only indirectly. The data also show that friends’ and parents’ smoking affect smoking escalation only indirectly. In general, friends’ smoking has a stronger effect on adolescents’ smoking behavior, particularly on initiation. Multiple group comparisons of the structural models predicting smoking initiation among males and females reveal that parental approval of smoking plays a significant mediating role for females, but not for males. Comparisons of Whites, Blacks, Hispanics, and other ethnic groups reveal that there are some significant differences in the pathways of friends’ influences among the four groups.

INTRODUCTION

Numerous studies have demonstrated that adolescents whose friends and/or parents use substances are more likely to use substances and to use them more frequently than youth whose friends and/or parents are nonusers

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Smoking Influence

(Needle et al. 1986). Smoking by significant others (especially friends) is one of the most consistent predictors of adolescent smoking. Most recently, Conrad, Flay, and Hill (1992) conducted a comprehensive review of prospective studies on predicting onset of cigarette smoking among adolescents. Of all studies reviewed, 13 examined the influences of parental smoking with seven showing significant results (Charlton and Blair 1989; Chassin et al. 1984, 1986; Goddard 1990; Murray et al. 1983; Semmer et al. 1987a; Semmer et al. 1987b), and 19 examined friends’ influences with 16 showing significant results (Alexander et al. 1983; Ary et al. 1983; Ary and Biglan 1988; Bauman et al. 1984; Charlton and Blair 1989 [females only]; Chassin et al. 1984, 1986; de Vries et al. 1990; McCaul et al. 1982; Mittelmark et al. 1987; Murray et al. 1983; Semmer et al. 1987a, 1987b; Stacy et al., unpublished; Sussman et al. 1987 [Asians only]; Urberg, Cheng, and Shyu 1991).

Although the total effects have been well documented, considerable disagreement remains regarding how these effects operate. For example, it is unclear whether the effects are direct or indirect, and the relative influence of parental and friends’ smoking on adolescents’ smoking is still a matter of debate. In addition, research has seldom examined the differential effects of parental and friends’ behavior on different stages of smoking, and little is known about gender and ethnic differences in the influences of parents and friends on adolescents’ smoking. The present research addresses these issues.

Direct or Indirect Effects

Although researchers agree that behaviors of others are important predictors of adolescent behavior, they do not agree about how others’ behaviors influence adolescents. For instance, investigators remain divided on whether others’ behaviors influence adolescents’ behavior directly or indirectly. Lau, Quadrel, and Hartman (1990) investigated influences of parents and peers on adolescent drinking, diet, exercise, and wearing of seat belts and found that direct modeling of health behaviors was the most important channel of influence from parents and friends. In a study of the influence of mothers’ behaviors on their children’s use of alcohol, marijuana, and pills, however, Newcomb, Huba, and Bentler (1983) found an indirect effect for alcohol and pill use and a direct effect for marijuana use. In addition, Biddle, Bank, and Marlin (1980) found that, although parents and peers had both direct and indirect influences on adolescents’ use of alcohol, peers were more likely to influence adolescents through direct modeling, while parents were more likely to exert their influence through norms.

Several different theories have been proposed to explain how significant others’ behaviors influence adolescent behavior. The classic modeling theory (Bandura 1969) suggests a direct effect. It postulates that parents or friends influence adolescent drug behavior by setting an example and providing social reinforcement. The theory emphasizes that direct observation and imitation of a particular behavior of significant others are the essential processes for adolescents to acquire that behavior. Akers’ social learning theory (Akers et al. 1979:638) also emphasizes that “social behavior is acquired through direct conditioning and through imitation or modeling of others’ behavior.” By contrast, cognitive-affective theorists (Ajzen 1985; Ajzen and Fishbein 1980; Fishbein and Ajzen 1975) have argued that the influences of others’ behavior operate indirectly and are mediated through cognitive-affective processes. In particular, Ajzen’s theory of planned behavior (TPB) (Ajzen 1985) insists that intentions are the immediate determinant of behavior. Intentions, in turn, are determined by three constructs: attitudes toward the behavior, subjective normative beliefs, and self-efficacy. TPB claims that other factors beyond the three constructs can only influence adolescents’ behavior by shaping these constructs.

Other theoretical frameworks, however, have recognized the importance of both direct modeling and cognitive mediation. For instance, Bandura’s social cognitive/learning theory has modified the classic modeling theory by including other mediating constructs, such as outcome expectations and self-efficacy (Bandura 1982, 1986). According to the theory, observing role models who use drugs will not only directly affect adolescents’ own drug behavior, but will also shape adolescents’ outcome expectations, which are their beliefs about the most immediate and most likely social, personal, and physiological consequences of drug use.
In addition, role models can shape adolescents' self-efficacy. For instance, observing peers purchase and inhale cigarettes can provide adolescents with the necessary knowledge and skills to obtain and use tobacco (use self-efficacy). Conversely, knowing and observing a close friend using drugs may erode adolescents' skills to refuse drug offers (refusal self-efficacy).

**Relative Influences of Parents and Friends**

Another unresolved issue concerns the relative influence of parents and peers on adolescents' behavior. It is agreed that both parents' and peers' drug-using attitudes and behaviors have a significant impact upon adolescent drug use, but the relative influence of parents and peers seems to vary with the use of different drugs (Chassin et al. 1986; Glynn 1981). Parents and peers are found to be equivalently influential on adolescent alcohol use. While peer influences predominate for marijuana use, parental influences appear to play a more important role in the use of illicit drugs other than marijuana. In addition, peer influences appear to be more influential in the earlier phases of drug use (e.g., using soft drugs), whereas parental influences become more important for advanced phases of drug use (e.g., using hard drugs) and tend to be of long-term impact.

Many studies have demonstrated that friends' smoking is a better predictor of an adolescent's smoking than is parental smoking (e.g., Alexander et al. 1983; Chassin et al. 1986; McCaul et al. 1982). One possible explanation comes from Kandel and Andrews (1987), who argue that the strength of influence from parents and friends depends on the quality of their social bond with adolescents. Given that adolescence is a period of increasing bonds with peers, and possibly of weakening bonds with parents, smoking among friends is expected to exert more influence on an adolescents' own smoking. If this is so, increasing peer influence is more likely to produce a direct path between friends' smoking and adolescents' smoking than between parental smoking and adolescents' smoking. However, this notion has never been tested with cigarette smoking.

**Stages of Cigarette Smoking**

Adolescent smoking is a dynamic rather than a static phenomenon (Flay et al. 1983). The process of becoming a smoker has been segmented into several stages, reflecting developmental changes and the transitions from never smoking to initiation of first cigarette, and from initiation of smoking to a higher level of smoking. There is some evidence that the influences of parents and peers may vary with different stages of drug use. Kandel and Andrews (1987) examined the processes of socialization by parents and peers with respect to adolescent use of alcohol and marijuana and found that modeling of parental behavior played the most important role in the early process of initiation, whereas modeling of peer behavior was more likely to occur after the stage of experimentation. In addition, Skinner et al. (1985) found that attachment to father and mother and association with female smoking friends were related to the initiation stage of cigarette smoking, while attachment to father and association with both male and female smoking friends predicted cessation. There has been no study attempting to examine possible different processes of social influences at different stages of cigarette smoking.

**Gender Differences in Social Influences**

There have been few systematic, focused investigations of gender differences in parental and peer influence on adolescent drug use. Existing literature suggests some gender differences in social influences. For instance, Chassin et al. (1986) found that peer and parent influences were significant for girls but not for boys. In a study of 7th through 9th grades in 11 schools in Los Angeles, Huba and Bentler (1980) found that the perceived number of peer drug-use models was a significant predictor of drug use for girls at all ages, but only at the high school level for boys. More recently, Waldron, Lye, and Brandon (1991) found that the association between smoking initiation and friends' smoking was stronger for girls than for boys. These findings suggest that girls may be more susceptible to social influences than boys. Part of such gender differences might be explained by females' stronger social bonds to parents and schools than boys (Ensminger,
Brown, and Kellam 1982). Another possibility lies in the hypothesis that girls are more peer-oriented than boys, which results in higher levels of exposure to social influences for girls. Previous research has found that girls tend to spend more time with friends of the opposite sex and are more involved in social activities such as dancing and youth clubs (Swan, Creeser, and Murray 1990).

Ethnic Differences in Social Influences

Ethnicity has been considered as an important moderating factor for population differences in social influences on adolescent drug use (Castro et al. 1987). In a study of the use of four types of drugs (beer/wine, hard liquor, marijuana, and pills) among Black, Hispanic, Asian, and White teenagers, Newcomb and Bentler (1983) found different effects of peer and adult drug use on adolescents’ self-use for different ethnic groups. In particular, for all the substances, Blacks reported the least impact of peer use on self-use relative to other ethnic groups; for beer or wine, Blacks and Hispanics reported the least impact of adult use on self-use; for marijuana, Asians reported the lowest impact of adult use; for pills, Whites reported the highest impact of adult use. Sussman et al. (1987) compared the psychosocial predictors of smoking onset among 7th- and 8th-grade White, Black, Hispanic, and Asian students, and found that some unique variables predicted smoking onset in different ethnic groups. For Whites, adult and peer models of smoking behavior were among the strongest predictors; for Blacks, risk-taking preference seemed to be more important than social influence variables; for Hispanics, adult and peer approval of smoking were among the most important determinants of adolescents’ own smoking; for Asians, influences from peers and family on cigarette smoking appeared to be secondary to the effects of poor school performance and low self-esteem.

Examination of the potentially different mechanisms through which parental and friends’ influences operate in different ethnic groups may contribute to the understanding of theoretical causes of cigarette smoking among adolescents in different cultures. An understanding of these differences, in turn, can provide more specific guidance on how adolescent smoking prevention and intervention strategies should be tailored to involve parents and friends by taking into account the social and ethnic background of the target population. The present research goes beyond previous studies by dissecting the direct and indirect effects of parental and friends’ influences on adolescents’ smoking behavior and, therefore, delineating the potentially different processes of social influences among different ethnic groups.

A Structural Model of Smoking Influence

By integrating different perspectives from various theories described previously, we propose a model of smoking influence for conducting a causal analysis of factors associated with adolescent smoking behaviors such as initiation and escalation. The model examines the interactive effects of eight constructs (Figure 1): (1) Friends’ Smoking, (2) Parental Smoking, (3) Negative Outcome Expectation, (4) Perceived Friends’ Approval of Smoking, (5) Perceived Parental Approval of Smoking, (6) Refusal Self-efficacy, (7) Smoking Intentions, and (8) Adolescent Smoking Behavior, representing smoking initiation and escalation, respectively, in the models of smoking initiation and escalation. We hypothesize that exposure to smoking parents and friends directly triggers smoking behavior (direct effects). We also hypothesize indirect effects as follows: (1) exposure to smoking parents and friends is expected to diminish adolescents’ negative outcome expectations about cigarette smoking and their refusal self-efficacy; (2) such exposure will foster adolescents’ perception of approval of smoking by parents and friends; and (3) diminished negative outcome expectations about cigarette smoking, elevated perceived approval of smoking, and lower refusal self-efficacy, in turn, are expected to affect adolescents’ smoking behavior through promoting adolescents’ smoking intentions. We also hypothesize that the disturbance terms of some of the mediating constructs will be correlated. Finally, we hypothesize that gender and ethnicity moderate the effects of parental and friends’ influences, and therefore multiple group comparisons of the structural models for the different gender and ethnic groups will be conducted to examine gender and ethnic differences in social influences.
METHODS

Subjects

The data for this study were collected as part of the Television, School, and Family Project (TVSFP, Flay et al. 1988) smoking prevention program in Southern California. Time 1 (T1) data were collected in 1986 from 6,695 seventh-grade students in 169 classrooms in Los Angeles County (representing 35 public schools in 4 school districts) and 67 classrooms in San Diego County (representing 12 public schools in 2 school districts). Of all the subjects, 49.6 percent were females, 15.5 percent were Blacks, 32.5 percent were Whites, 35.5 percent were Hispanics, and 16.5 percent belonged to other ethnic groups (half were Asians, referred to as “Others/Asians” in the rest of the text). Time 2 (T2) data were collected 15 months later than T1, when 4,896 (73.13%) of T1 subjects were recontacted as eighth-graders.

For the purpose of this study, only those who reported “never smoking” and smoking only one or less than one cigarette at T1 were included in the analyses. We excluded those students who reported a disruptive family structure (e.g., single parent or no parent) from the analysis. The eligible sample for the initiation analysis consisted of those students who reported never smoking at T1 and provided information on all of the items of interest. The final sample for the initiation analysis had 1,402 subjects (55.07% were females; 12.4% were Blacks, 38.0% were Whites, 30.0% were Hispanics, and 22.2% were Others/Asians).

The eligible sample for the escalation analysis consisted of those students who reported smoking one or less than one cigarette at T1 (experimenters) and provided valid information on all of the items of interest. The final sample for the model estimate was 527 (54.08% were females, 11.05% were Blacks, 37.14% were Whites, 30.48% were Hispanics, and 21.33% were Others/Asians).

Measurement of Variables

Exogenous Variables. The exogenous variables, friends’ smoking and parental smoking, were measured at T1. Friends’ smoking had two indicators: friends’ trying smoking and friends’ regular smoking. Friends’ trying smoking was assessed by asking the students how many of their ten closest friends had tried a cigarette, and friends’ regular smoking was measured by asking how many of their ten closest friends usually smoked at least one
cigarette a week (from 1 = none to 6 = 8–10 friends). Because the responses to the two items were highly skewed, they were recoded as dichotomized variables, with 0 = none of friends try smoking (smoke at least one cigarette a week) and 1 = one or more friends try smoking (smoke at least one cigarette a week). Parental smoking also had two indicators: fathers’ smoking and mothers’ smoking. Fathers’ smoking was measured by asking the students how often their father (or stepfather) smoked cigarettes (where 1 = I do not have a father or stepfather, 2 = he doesn’t smoke, to 7 = he smokes 2 or more packs a day). The same measure was developed for mothers’ smoking. Again, these variables were recoded as 0 = doesn’t smoke currently and 1 = smokes currently.

Endogenous Variables. Endogenous variables included negative outcome expectations, perceived friends’ approval of smoking, perceived parental approval of smoking, intentions to smoke, initiation of smoking (in the model for smoking initiation), and escalation of smoking (in the model for smoking escalation). All the endogenous variables were measured at T1 except initiation and escalation of smoking. Negative outcome expectations were measured by asking four questions concerning the health consequences of cigarette smoking: how likely it is (from 1 = more than 80% likely to 5 = less than 20% likely) that smokers in general will contract lung career or heart disease; how likely it is that smokers in general might die from lung cancer or heart disease; how likely it is that you would contract lung cancer and heart disease if you smoked; and how likely it is that you would die from those diseases if you smoked. These four items served as four indicators for the construct of negative outcome expectations.

Perceived friends’ approval of smoking was assessed by asking the students how many of their ten closest friends would approve if they smoked cigarettes (from 1 = none to 6 = 8–10 friends). Perceived parental approval of smoking was measured by asking how students’ parents would feel about their smoking (from 1 = definitely disapprove to 5 = definitely approve). Refusal self-efficacy was assessed by asking the students how hard it would be to refuse a friend’s offer of cigarettes (from 1 = extremely hard to 6 = not at all hard). Intentions were measured with two items. The students were asked if they thought they would ever smoke in the future and if they thought they would ever ask another person to let them try a cigarette (responses to both items ranged from 1 = definitely would to 6 = definitely would not). These two items served as two indicators for the construct of smoking intentions.

Initiation of smoking was measured by contrasting self-reported lifetime smoking at T1 and T2. The students were asked: How many cigarettes have you smoked in your whole life? (where 1 = none at all, 2 = I have had only one puff, 3 = part or all of one cigarette, 4 = 2 to 4 cigarettes, 5 = 5 to 20 cigarettes, 6 = 1 to 5 packs, and 7 = more than 5 packs). Initiation of smoking was coded as 0 (remained never smoking) and 1 (transition from never smoking to initiation of smoking). That is, if participants were never-smokers at T1 but became smokers by T2, they were classified as “initiators.” Of the 1,402 never-smokers at T1, 450 (32.1%) became “initiators” by T2.

Escalation of smoking was also measured by contrasting self-reported lifetime smoking at T1 and T2. Escalation of smoking was coded as 0 (remained experimenting with smoking) and 1 (transition to a higher level of smoking). That is, if participants smoked only one puff or part or all of one cigarette at T1 (experimenters), but smoked two to four cigarettes or more by T2, they were classified as “escalators.” This study only considered the transition from experimental smoking (smoking all of one cigarette or less) at T1 to a higher level of smoking (smoking more than one cigarette) at T2. We did not consider other kinds of smoking transitions in this paper. Of the 527 experimenters at T1, 265 (50.3%) became “escalators” by T2.

Analytic Strategy

Structural equation modeling was the major analytic strategy in this study (Jöreskog and Sörbom 1988). Because most of the measures were ordinal, we used polychoric or polyserial correlations. We then used the method of weighted least squares (WLS) to estimate the parameters for the total sample and for different genders. Multiple group comparisons were conducted to examine the difference in parameter estimates for the structural equation models of smoking initiation among different gender and ethnic groups. Since
some of the ethnic groups (e.g., Blacks and Others/Asians) consisted of relatively small samples, an asymptotic variance and covariance matrix could not be constructed. As a result, WLS could not be used in the model estimates for these groups. Consequently, we used a maximum likelihood solution (MLS) in the structural model estimates for all the ethnic groups and for the multiple group comparisons. Structural model comparisons could not be conducted for the models of smoking escalation because of the limited samples in the subgroups.

RESULTS

Smoking Initiation Mean Analysis

Table 1 shows the group means for the gender and ethnic groups on the 14 variables used in constructing the structural models predicting smoking initiation. Overall, there were no significant differences in the mean levels of most variables between males and females except that males reported slightly higher levels of friends’ and parental approval of smoking than females ($p < .05$).

A one-way analysis of variance for the four ethnic groups on each of 14 variables was conducted to test the difference in group means. The results indicated that significantly more friends had tried cigarette smoking among Whites than among Others/Asians but the number of regularly smoking friends appeared to be similar across the four groups. A significantly higher percentage of Blacks reported father smoking compared to Whites (41% vs. 28%) and mother smoking compared to Whites, Hispanics, and Others/Asians (37% vs. 20%, 17% and 14%, respectively). With regard to the negative outcome expectation variables, Whites scored significantly lower on two of the items than other ethnic groups. This suggested that Whites had fewer negative beliefs about the health consequences of cigarette smoking than other groups. There were no significant differences in the perceived numbers of friends who would endorse adolescents’ own smoking, but Hispanics reported higher levels of parental approval of smoking than other ethnic groups. In addition, both Blacks and Whites scored significantly higher on refusal self-efficacy than Hispanics and Others/Asians.

On the smoking intention variables, Whites reported significantly lower intentions to smoke in the future than Blacks and Hispanics, and Others/Asians reported significantly lower intentions to ask another person to let them try a cigarette than Hispanics. Finally, there were no significant differences in the smoking initiation rates across the four groups using pairwise comparison (31% for Blacks and Whites, 37% for Hispanics, and 27% for Others/Asians).

Overall Smoking Initiation Structural Modeling

A total of 1,402 subjects were used in estimating the structural model predicting smoking initiation. We used weighted least-square methods to estimate structural coefficients and model fit. We estimated an initial model (full model) with all the hypothesized pathways depicted in Figure 1. Then a final model was estimated with only statistically significant paths retained. The initial model provided a good representation of the data ($\chi^2(57) = 62.07, p = .300$, Goodness-of-Fit Index (GFI) = .997). After eliminating nonsignificant paths, the final model ($\chi^2(65) = 70.91, p = .287$, GFI = .996) fitted the data well.

Figure 2 shows parameter estimates for the final structural model of smoking initiation. The results generally supported our hypotheses. The model showed that friends’ smoking had both direct and indirect effects on smoking initiation. The indirect effects were channeled through smoking intentions and negative outcome expectations. As expected, exposure to smoking friends directly triggered initiation of cigarette smoking. Also, exposure to smoking friends elevated adolescents’ smoking intentions, while also diminishing adolescents’ negative outcome expectations about cigarette smoking which, in turn, elevated adolescents’ smoking intentions. Although friends’ smoking had a strong effect on friends’ approval of smoking, this effect did not seem to carry through to intentions. Parental smoking had only indirect effects on smoking initiation. These effects were mediated through smoking intentions, negative outcome expectations, and parental approval of smoking.

Overall Smoking Escalation Structural Modeling

A total of 518 subjects were eligible for model estimation. Again, we used weighted
<table>
<thead>
<tr>
<th>TABLE 1. Means and Standard Deviations of Measured Variables for the Different Gender and Ethnic Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender Groups</strong></td>
</tr>
<tr>
<td>Males</td>
</tr>
<tr>
<td>(N = 629)</td>
</tr>
<tr>
<td><strong>Exogenous Variables</strong></td>
</tr>
<tr>
<td>1. Friends’ Smoking</td>
</tr>
<tr>
<td>Friends’ trying smoking (0–1)</td>
</tr>
<tr>
<td>Friends’ regular smoking (0–1)</td>
</tr>
<tr>
<td>2. Parental Smoking</td>
</tr>
<tr>
<td>Father smoking (0–1)</td>
</tr>
<tr>
<td>Mother smoking (0–1)</td>
</tr>
<tr>
<td><strong>Endogenous Variables</strong></td>
</tr>
<tr>
<td>1. Negative Outcome Expectations</td>
</tr>
<tr>
<td>a. Smokers contract lung cancer/heart disease (1–5)</td>
</tr>
<tr>
<td>b. Smokers die from lung cancer/heart disease (1–5)</td>
</tr>
<tr>
<td>c. ’You contract lung cancer/heart disease if you smoke,’ (1–5)</td>
</tr>
<tr>
<td>d. ’You die from heart disease/lung cancer if you smoke,’ (1–5)</td>
</tr>
<tr>
<td>2. Perceived Friends’ Approval of Smoking (1–6)</td>
</tr>
<tr>
<td>3. Perceived Parental Approval of Smoking (1–5)</td>
</tr>
<tr>
<td>4. Refusal Self-Efficacy (1–6)</td>
</tr>
<tr>
<td>a. Smoke in the future (1–6)</td>
</tr>
<tr>
<td>b. Ever ask another person to let them try a cigarette (1–6)</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .001.

Notes: Two subjects did not provide information on gender, and six subjects did not provide information on ethnicity. The total sample sizes for gender and ethnic analyses were 1,400 and 1,396, respectively. Same letters in a row indicate that these ethnic groups have significantly different means.
least-square methods to estimate structural coefficients and model fit. The initial model (full model) with all hypothesized pathways fitted the data well ($\chi^2(59) = 46.39, p = .883, \text{GFI} = .993$). After deleting the nonsignificant paths, the final model was obtained ($\chi^2(68) = 53.98, p = .892, \text{GFI} = .991$).

Figure 3 shows the parameter estimates from the final structural model predicting smoking escalation. Neither friends' smoking nor parental smoking had direct effects on escalation. The indirect effects of friends' smoking were channeled through negative outcome expectations, perceived friends' approval of smoking, and refusal self-efficacy. As anticipated, exposure to smoking friends diminished adolescents' negative outcome expectations, fostered their perceived friends' approval, and eroded their refusal self-efficacy, all of which indirectly affected adolescents' escalation of smoking through smoking intentions.

Parental smoking also had significant effects on negative outcome expectations about cigarette smoking. Additionally, parental smoking improved adolescents' perceived approval of smoking from their parents, but had no significant effects on refusal self-efficacy.

In order to compare the relative influences of friends and parents at different stages of smoking, we presented decompositions of the effects of friends' and parental smoking on adolescents' smoking initiation and escalation from the estimation of the full models (Table 2). Both friends and parents had stronger total effects on smoking initiation than on escalation. In addition, the relative impact of friends and parents seemed to vary with the stages of smoking. It was obvious that friends had stronger direct and total effects on initiation than parental smoking, but the picture was less clear for escalation. Both friends and parents had very weak effects on escalation and the influences were only indirect.

**Gender and Ethnic Differences in Friends' and Parental Influences**

Multiple group comparisons were conducted to test for gender and ethnic differences in the smoking initiation structural models. To compare the fit of the models for different gender and ethnic groups, we evaluated four models with different equivalence constraints for the samples, separately for gender and ethnic comparisons (Table 3).
The first model applied the basic model to the samples with equivalence constraints only on the measurement model. The second model included equivalence constraints on the measurement model and all the paths from friends' smoking to the endogenous latent constructs. The comparison of Models 1 and 2 tested if there were significant differences in all the paths from friends' smoking to endogenous variables across the four groups. The third model included equivalence constraints on the measurement model and the paths from both friends' smoking and parental smoking to all endogenous variables. The comparison of Models 3 and 2 tested the differences in all the paths from parental smoking across the groups. The last model was estimated with equivalence constraints on the measurement model and all structural parameters. The comparison of Models 4 and 3 tested the differences in the mediating paths (including the paths from negative outcome expectations, perceived friends' approval of smoking, perceived parental approval of smoking, and refusal self-efficacy to smoking intentions, and the path from smoking intentions to initiation).

**Gender Comparisons:** Goodness-of-fit tests were conducted by comparing the relative fit of the data provided by nested models (Table 3 shows the chi-squares associated with the four models). We compared Models 2 and 1 and did not find a significant increase in the chi-square ($\chi^2(5) = 5.41, p > .05$), suggesting that there were no significant gender differences in the paths from friends' smoking to endogenous variables. The comparison of Models 3 and 2 also yielded a nonsignificant result ($\chi^2(5) = 4.48, p > .05$).

### TABLE 2. Decomposition of the Effects of Friends' Smoking and Parental Smoking on Adolescents' Initiation and Escalation of Smoking

<table>
<thead>
<tr>
<th></th>
<th>Initiation of Smoking</th>
<th>Escalation of Smoking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Effects of Friends' Smoking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Effects</td>
<td>.280***</td>
<td>-</td>
</tr>
<tr>
<td>Indirect Effects</td>
<td>.086***</td>
<td>.064***</td>
</tr>
<tr>
<td>Total Effects</td>
<td>.366***</td>
<td>.064***</td>
</tr>
<tr>
<td><strong>The Effects of Parental Smoking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Effects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Indirect Effects</td>
<td>.087***</td>
<td>.041*</td>
</tr>
<tr>
<td>Total Effects</td>
<td>.087***</td>
<td>.041*</td>
</tr>
</tbody>
</table>

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

*'-'- The direct paths were eliminated in the final models because they were not significant.

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**FIGURE 3. Smoking Escalation Structural Model for the Total Sample** (Significant values for coefficients are: *$p < .05$; **$p < .01$; ***$p < .001$).
### Table 3. Multiple Group Comparison of Structural Models of Significant Others’ Influences on Adolescents’ Initiation of Smoking for the Different Gender and Ethnic Groups

<table>
<thead>
<tr>
<th>Models</th>
<th>Gender Groups</th>
<th>Ethnic Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Equivalent Constraints on Factor Loadings</td>
<td>107.81 (130)</td>
<td>321.24 (266)</td>
</tr>
</tbody>
</table>
| 2. Equivalent Constraints on Factor Loadings and all Paths from Friends’ Smoking to the Endogenous Variables | 113.22 (135)  | 347.83 (281)  | 26.59 (15)*
| 3. Equivalent Constraints on Factor Loadings and all Paths from both Friends’ Smoking and Parental Smoking to all Endogenous Variables | 117.70 (140)  | 362.95 (296)  | 15.12 (15) |
| 4. Equivalent Constraints on Factor Loadings and all Structural Parameters | 140.53 (145)  | 378.77 (311)  | 15.82 (15)  |

* p < .05; ** p < .01; *** p < .001.

The chi-squares associated with the four nested models for the ethnic groups are also shown in Table 4. We compared Models 2 and 1 and found a significant increase in the chi-square ($\chi^2(15) = 26.59, p = .03$), suggesting significant differences in the paths from friends’ smoking to the endogenous variables across the four groups. The comparison of Models 3 and 2 yielded a nonsignificant result ($\chi^2(15) = 15.12, p > .05$), indicating that the paths from parental smoking to the endogenous variables were not significantly different among the four ethnic groups. Finally, comparison of Models 4 and 3 showed that the mediating paths between friends’ and parental smoking and initiation of smoking were also not significantly different among the four groups ($\chi^2(15) = 15.82, p > .05$).

Since we found significant differences in friends’ pathways among the four groups, further analyses were conducted to examine which path(s) accounted for the differences. Using the multiple group comparisons as described above, we conducted the analyses path by path. A total of five paths (friends’ smoking to initiation, friends’ smoking to intentions, friends’ approval to intentions, refusal self-efficacy to intentions, and intentions to initiation) were compared separately. The results showed that the differences lay in two paths: (1) the path from friends’ smoking to negative outcome expectations, which was significant for Whites but not for other groups, and (2) the path from friends’ smoking to refusal self-efficacy, which was significant only for Whites.

Table 4 presents the decompositions of parental and friends’ effects for the different gender and ethnic groups. The total effects of friends’ smoking on initiation were similar for males and females, but males had more direct effects and females had more indirect effects. Parental smoking had only indirect effects on initiation, but the effects appeared to be greater for females than for males.

In regard to the four ethnic groups, it was clear that friends’ smoking had much stronger effects than parental smoking across all the groups. Friends’ smoking had significant direct effects on initiation for all groups, but
TABLE 4. Decomposition of the Effects of Friends' Smoking and Parental Smoking on Adolescents' Initiation for Different Gender and Ethnic Groups

<table>
<thead>
<tr>
<th>Gender Groups</th>
<th>Ethnic Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (N = 629)</td>
<td>Black (N = 174)</td>
</tr>
<tr>
<td>Females (N = 771)</td>
<td>White (N = 533)</td>
</tr>
<tr>
<td></td>
<td>Hispanic (N = 378)</td>
</tr>
<tr>
<td></td>
<td>Other/Asian (N = 311)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The Effects of Friends' Smoking</th>
<th></th>
<th>The Effects of Parental Smoking</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Effects</td>
<td>.316**</td>
<td>Direct Effects</td>
<td></td>
</tr>
<tr>
<td>Indirect Effects</td>
<td>.042**</td>
<td>Indirect Effects</td>
<td>.366*</td>
</tr>
<tr>
<td>Total Effects</td>
<td>.358***</td>
<td>Total Effects</td>
<td>.366*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

* p < .05; ** p < .01; *** p < .001.
‘—’ These paths were eliminated in the final models because they were not significant.

the indirect effects were significant only for Whites and Hispanics. Parental smoking had significant indirect effects on initiation only for Hispanics.

DISCUSSION AND CONCLUSIONS

The purposes of this study were to examine the differential influence of parental smoking and friends' smoking on adolescents' initiation and escalation of smoking, and to explore gender and ethnic differences in parental and friends' influences on adolescents' smoking behavior. We began this paper by raising several different issues about the effects of others' behavior on adolescent smoking. We employed structural equation models to address these issues.

The first issue addressed concerns about whether others' behaviors affected adolescent smoking by direct modeling or indirectly through mediating variables. Our results clearly show that friends' smoking has both direct and indirect influences on adolescent initiation of smoking, but only indirect effects on escalation. Parental smoking has only indirect effects on initiation and escalation, channeled through mediating variables.

The second issue concerns the relative influence of parental and friends' smoking on adolescents' smoking behavior. Our findings suggest that friends' smoking has stronger influences on smoking initiation than does parental smoking, and the pattern becomes more pronounced when ethnic groups are examined separately.

The third issue concerns the different effects of others' behavior on different stages of smoking behavior, that is, initiation and escalation of smoking. Our study shows that friends' smoking has stronger influences on initiation than on escalation. In addition, friends' smoking can directly influence initiation of smoking, but its influence on smoking escalation is only indirect. Moreover, its indirect effects on initiation are channeled through negative outcome expectations and intentions, while the indirect effects of friends' smoking on escalation are channeled through perceived friends' approval of smoking and refusal self-efficacy, in addition to negative outcome expectations and intentions. Parental smoking has only indirect effects on smoking initiation and escalation.

Finally, the study addresses gender and ethnic differences with respect to the effect of friends' and parental smoking on adolescent initiation of smoking. Multiple group comparisons of the structural model predicting smoking initiation between males and females show that parental approval of smoking mediates the effects of parental smoking for females, but not for males. It is also shown that the effects of parental smoking are stronger for females than for males. These results are consistent with previous findings that girls might be more susceptible to social influences, especially parental influences, than boys (Ensminger et al. 1982).

Multiple group comparisons among Whites, Blacks, Hispanics, and Others/Asians revealed that there are some significant differences in friends' influences. In particular, aside from the common significant pathways such as the paths from friends'
smoking to initiation and friends' approval of smoking, other unique pathways are specifically relevant to the prediction of smoking initiation in different ethnic groups. For Whites, friends' smoking has significant effects on adolescents' refusal self-efficacy; for Hispanics, it has significant effects on negative outcome expectations. In addition, friends' smoking has both significant direct and indirect effects on initiation for Whites and Hispanics and only significant direct effects for Blacks and Others/Asians.

The present research is not intended to test specific theories. Instead, we construct hypotheses from different perspectives and various theories of social influences, which we then integrate into a unified model to clarify the process of the influences of friends' smoking and parental smoking on adolescents' smoking behavior. Our results provide support for most of the theoretical perspectives integrated in the overall structural model and raise some questions about others.

Consistent with social learning/cognitive perspectives, our models reflect two basic learning processes; that is, modeling and cognitive mediation. Modeling is a learning process that occurs by observing others and directly copying their behaviors. This process produces direct effects in our model. Conversely, cognitive mediation is a learning process through which others' behaviors affect the antecedent determinants of behaviors first, such as outcome expectancies and self-efficacy, which, in turn, affect adolescents' own behaviors. Our study underscores the importance of the roles played by both modeling and cognitive mediation in adolescents' smoking behavior. However, the two processes may occur in a different manner at different stages of behavior. Specifically, modeling friends' smoking behavior appears to dominate the process of adolescents' smoking initiation, whereas the influence of friends' smoking on escalation mainly results from the mediating effects. These findings speak directly to the concept of social learning postulated by Krohn et al. (1985), that initial engagement in smoking behavior is likely to be a result of imitation of role models. After initial use, social and nonsocial reinforcement is more likely to be experienced, and therefore, maintenance of the behavior is less dependent on imitation of others' behavior. Furthermore, our study points out that adolescents' learning processes may vary with the sources of the influences. In particular, adolescents are more likely to copy their friends' smoking behavior directly, while parental behaviors tend to exert their influences by affecting adolescents' smoking attitudes and beliefs.

The present study also provides considerable support for the theory of reasoned action (Fishbein and Ajzen 1975; Ajzen and Fishbein 1980) and the theory of planned behavior (Ajzen 1985). Specifically, our models demonstrate a strong linkage between intentions and actual smoking behavior and the predictive role of outcome expectations, perceived friends' and parental approval of smoking, and refusal self-efficacy. It should be noted, however, that operationalization of variables in our study does not fully correspond to Ajzen's theory. For instance, the concept of social normative beliefs, an important construct in the theory of planned behavior, is not included in our models. Instead, we use the constructs of perceived friends' and parental approval, which are only partial measures of social normative beliefs, as mediating variables. Similarly, regarding another important construct, attitudes toward behavior, we include only the health consequences component of smoking attitudes. The psychosocial part of smoking attitudes may be more important in predicting adolescents' smoking behavior. In addition, our models include only refusal self-efficacy, even though the concept of use self-efficacy, which represents adolescents' belief in their ability to obtain and use cigarettes, may be equally important. Moreover, Ajzen and Fishbein (1980) have emphasized the importance of correspondence between the measures of intention and behavior and recommended short time periods from intention to behavior. In this particular study, our outcomes (smoking initiation and escalation) do not have a definite time frame, but could have occurred at any time during the 15-month follow-up. Nevertheless, the strong linkage between intentions and behavior demonstrated in this study can be viewed as further evidence for the importance of the mediating role of intentions postulated by Ajzen and Fishbein.

Finally, our models suggest that there exist significant paths from parental and friends' smoking to adolescent intentions to smoke. These findings are counter to Ajzen and Fishbein's basic notion that intentions are the
exclusive determinant of behavior and that intentions, in turn, are only determined by attitudes, social normative beliefs, and self-efficacy. The same challenge has been raised by other researchers. For instance, Bentler and Speckart (1979) found that prior experience with drugs could directly affect current drug use.

Generally speaking, this research is consistent with the socialization theory. As discussed by Kandel, Kessler, and Margulies (1978:73), the use of drugs by adolescents "provides a unique opportunity for studying processes of socialization, whereby individuals learn values and behaviors." Our results are consistent with previous research on adolescent socialization into marijuana, alcohol, and hard drug use (Kandel et al. 1978; Kandel and Adler 1982; Kandel and Andrews 1987) on the following points: (1) friends can influence adolescents' behavior by direct modeling, cognitive-mediation, or both; (2) in general, friends have more influence than parents in early adolescence; and (3) the influence of parents and peers occurs in a different manner at different stages of behavior. Furthermore, this study demonstrates that the social influences on adolescent initiation of smoking may differ by gender and ethnic group, suggesting that socialization processes may vary by gender and may also vary in different cultures.

One limitation of this study stems from the fact that all measures of smoking were provided by adolescents, including measures of smoking among parents and friends. In particular, this study assesses the relationship between (1) adolescents' reports of their own smoking, and (2) their perceptions of smoking among their parents and friends. This study does not consider whether parents and friends actually smoke at the levels reported by subjects. When addressing social influences on smoking, the distinction between perceptions of smoking among others and actual smoking among others is critical because some studies (e.g., Iannotti and Bush 1992) have found that the perception of smoking among friends is more closely related to an adolescent's own smoking than is the actual number of friends who smoke. Consequently, our reliance on adolescents' perceptions of smoking among others might have led us to overestimate the effects of parental and friends' actual smoking behavior.

Another constraint of this study arises from the fact that we exclude those students who came from disrupted families. Consequently, this research may be generalizable only to those students who have an intact family. Previous studies have documented that family structure is an important predictor of drug use (e.g., Baumrind 1985; Kandel et al. 1978). In particular, these studies found that children and young adolescents from homes with single or divorced parents were at risk for subsequent marijuana use. In this regard, the social influences of cigarette smoking for children from an intact family might be different from those from a disrupted family. Further research is needed to test this hypothesis.

Finally, it should be pointed out that siblings, especially older siblings, can be considered as an important source of influence on adolescent substance use. Siblings have been characterized as a special category of peer influence and they can act as role models by reinforcing certain behavioral patterns (Needle et al. 1986). Adolescents whose older siblings smoke are more likely to adopt the behavior than those whose siblings do not smoke (Alexander et al. 1983; de Vries et al. 1990; Goddard 1990; Murray et al. 1983). Penning and Barnes (1982) have reported that older siblings' influence on adolescent substance use is greater than parents' but less than peers' influence. Unfortunately, limited data on siblings does not permit us to examine this issue in our models. Further research is needed to explore the socialization role of siblings, relative to friends and parents, in adolescent smoking onset.

In conclusion, the present study points out the differential influences of parental smoking and friends' smoking on adolescent initiation and escalation of smoking. The study underscores the importance of differential theoretical perspectives, all of which have important implications for tobacco prevention and intervention (Flay and Petraitis, forthcoming). From cognitive-affective perspectives, the key to preventing tobacco use is through persuasive messages which directly target tobacco-specific beliefs. The messages should increase adolescents' expectations regarding the adverse consequences of using tobacco and decrease their expectations regarding the potential benefits of using tobacco. Meanwhile, messages should challenge adoles-
cents' perceptions concerning the normative nature of tobacco use, perhaps by challenging any inflated estimates of prevalence and perceived approval of tobacco use among their peers. From social learning perspectives, a major key to prevention lies in making tobacco-using role models less salient and enhancing adolescents' refusal skills are crucial as well. Finally, the findings of gender differences in smoking influences from this study suggest that smoking prevention and intervention programs need to be sensitive to culture and gender.

NOTES
1. Although the study intervention influenced some mediating variables, the intervention did not influence cigarette smoking or other drug use (Flay et al. forthcoming). Thus, smoking rates in the intervention group did not differ significantly from that of the control group at baseline and after intervention. Consequently, the present research collapsed the samples from the intervention and the control groups. In addition, since all of the mediating variables used in the present study were measured at baseline, the intervention was not considered to have any significant effects on the model estimates. To confirm this, we applied the same structural models used in the study to the intervention and control groups separately and employed multiple group comparisons to test if there was any significant difference in the structural models between the intervention and control groups. The results showed that, for the smoking initiation structural model, the relative fit of the model with equivalence constraints on the measurement model was \( \chi^2 = 207.09 \) (d.f. = 151) and the relative fit of a nested model with equivalence constraints on both measurement and structural models was \( \chi^2 = 231.09 \) (d.f. = 166). The difference in the fit of the data provided by the two models was not significant \( (\chi^2 = 24.00 \) (d.f. = 15), \( p > .05) \), indicating that there were no significant differences in the smoking initiation structural models between the intervention and control groups. In regard to the smoking escalation structural models, the relative fits of the two nested models were \( \chi^2 = 155.84 \) (d.f. = 151) and \( \chi^2 = 164.69 \) (d.f. = 166), respectively. The difference in the relative fit between the two models was not significant either \( (\chi^2 = 8.85 \) (d.f. = 15), \( p > .05) \).

2. Based on the responses to the questions about parental smoking (discussed below in "measurement of variables"), when we allowed for "do not have a father or stepfather" and "do not have a mother or stepmother" responses, we conducted additional analyses to examine ethnic differences in family structure. The results showed that among Blacks, 2.25 percent reported not having a father or a mother, 7.09 percent did not have a father, and 2.58 percent did not have a mother; among Whites, .48 percent did not have a father or a mother, 5.25 percent did not have a father, and .99 percent did not have a mother; among Hispanics, 1.10 percent did not have a father or a mother, 7.68 percent did not have a father, and 1.46 percent did not have a mother; among Others/Asians, the corresponding percentages were 1.02 percent, 5.22 percent, and 1.59 percent, respectively. In order to control for the confounding effects of family structure, our analysis only included those who had an intact family (having both parents). Consequently, significantly higher proportions of Blacks and Hispanics (especially Blacks) were excluded from this study.

3. One anonymous reviewer suggested that one additional comparison of a new model with equivalence constraints on measurement model and paths from parental influences against Model 1 was needed to estimate the "pure" parental influences. We took this suggestion and the results remained unchanged. Specifically, the difference of chi-squares between the new model and Model 1 was 4.19 with five degrees of freedom \( (p > .05) \) and the difference of chi-squares between the new model and Model 3 was 5.70 with five degrees of freedom \( (p > .05) \). These results were very close to those shown in Table 3. Meanwhile, we conducted similar analyses for ethnic group comparisons. The difference of chi-squares between the new model and Model 1 for the four ethnic groups was 15.88 with 15 degrees of freedom \( (p > .05) \) and the difference of chi-squares between the new model and Model 3 was 25.83 with 15 degrees of freedom \( (p < .05) \). These results were also similar to those in Table 3.

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