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*Abstract: The study's purpose was to determine which factors were the strongest predictors of tobacco smoking behaviors among U.S. adolescents. The population included a nationally representative sample of 6,504 adolescents residing in the U.S. Data were collected in respondents' homes using trained interviewers. Weighted population estimates showed that over half (55.6%) of adolescents had "ever tried smoking," nearly half of whom (48.2%) reported "regular smoking." Those whose closest friends smoked were twice as likely to "ever smoke" (*OR = *2.24,* p < *.001), twice as likely to be a "regular smoker" (*OR = *2.28,* p < *.001), and more likely (*b = *5.15* p < *.001) to have smoked daily than those whose friends do not smoke. Results show the very strong influence of friendships on tobacco initiation and continuance among this national sample of adolescents. Recommendations for primary and secondary prevention are noted.*

The Centers for Disease Control and Prevention (CDC) estimates that over 6.4 million children living today will die prematurely as the result of a decision made during adolescence – to smoke cigarettes (2003). Three major factors increase the likelihood that a young nonsmoker will start using tobacco: (1) psychosocial factors such as personality or parental role modeling of tobacco use, (2) peer pressure to smoke, and (3) industry influence (e.g., advertising, legislation, restriction to access, and lack of health education) (U.S. Department of Health and Human Services [USDHHS], 2000a). The Surgeon General confirmed recently that smoking remains the leading cause of preventable death and disease in the United States and those who suffer the most are poor Americans, minority populations, and young people (USDHHS, 2000a).

Likewise, a large-scale review of research literature identifies cigarette smoking as one of the 10 leading health indicators for major health problems in the U.S. (Williamson & De Zwart, 1999). Additionally, the CDC identifies an array of illnesses, including chronic lung disease, heart disease, stroke, and many types of cancer (e.g., lungs, larynx, esophagus, mouth, and bladder) as being directly attributed to tobacco smoking behaviors (2002).

In *Healthy People 2010*, the health promotion and disease prevention agenda for the nation, adolescent substance use, misuse, and abuse is considered to be a priority area for prevention. One stated goal is to "reduce illness, disability, and death related to tobacco use and exposure to secondhand smoke" (USDHHS, 2000b, p. 27-3). Among the many tobacco-prevention goals identified in *Healthy People 2010*, the following three complement the knowledge gained from the current research: (1) reducing tobacco initiation among children and adolescents, (2) increasing the average age of first tobacco product use among adolescents and young adults, and (3) increasing adolescents' disapproval of smoking to 95% for those in grades 8-12.

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The USDHHS (2000b; 2000c) defines cigarette smoking on three levels: (1) *lifetime* smokers are identified as having ever smoked cigarettes in their lifetime, (2) *current smoking* is defined as smoking at least once in the prior month, and (3) *frequent smoking* is defined as smoking at least 20 days within the past month. The Youth Risk Behavior Survey, a longitudinal measure of the prevalence of health risk behaviors among adolescents, reveals that lifetime smoking among adolescents remained stable from 1991 to 1999 with 70.4% of all students reporting lifetime smoking. Quite significant, however, was the 7% increase in the trends for frequent cigarette smoking that emerged between 1991 and 1999 (USDHHS, 2000b).

Recent research documents that those who first experiment with cigarette smoking are likely to progress to daily smoking (Lamkin, Davis, & Kamen, 1998). The 1999 National Household Survey on Drug Abuse estimates that approximately 3.2 million people tried their first cigarette in 1997, most of whom were age 12-17 (USDHHS, 2003). Today, the average age of first use, nationally, is 15 (Burns & Johnson, 2001). It also has been noted that youth are less likely to quit during their lifetime when tobacco use is initiated at younger ages (Everett, Warren, Sharp, Kann, Husten, & Crosett, 1999). In national reports, the tobacco use trends among boys and girls were reported to be higher among adolescent girls than among adolescent boys in the late 1970s and early 1980s, although declines in use over the next 14 years were greater for girls than for boys. In the mid-1990s, however, the prevalence of smoking for adolescent girls and boys was fairly even, and there were no statistically significant differences between the two by 1998 (Burns & Johnson, 2001; USDHHS, 1997b). The most recent evidence of tobacco use trends reported by the National Cancer Institute (2001), however, shows that while there have been promising declines in adolescent smoking over the last decade "there is little evidence of a decline in initiation for females under 16 years old, and the initiation rates increased for females 16 years and older" (p.1).

Nicotine addiction generally develops within the first year of cigarette smoking (Burns & Johnson, 2001). Most adults (89%) who reported that they had experimented with their first cigarette before their 18th birthday have consequently extended their lifetime dependency on nicotine (Lamkin, Davis, & Kaman, 1998). Recent research (Everett, et al., 1999; National Cancer Institute, 2001) shows those who began smoking as younger children have difficulty quitting by younger or middle-adulthood. In fact, some researchers have documented that younger smokers tend to: (a) smoke more cigarettes per day, (b) smoke for more years to come, and (c) be less likely to quit than their older counterparts (American Academy of Pediatrics, 2000). These compelling statistics underscore the significance for using primary and secondary prevention programs to reduce tobacco initiation and continuation among youth and adolescents.

Given the severe health consequences associated with cigarette smoking noted above and evidence that few people begin cigarette smoking after age 20 (Ineichen, 1999), the current investigation uses nationally representative data to determine which factors were the strongest predictors of adolescent smoking behaviors. Specifically, a secondary analysis of the National Longitudinal Study of Adolescent Health *Public Release* data (Wave I) was conducted to: (a) establish the relationship between adolescent cigarette smoking and select demographic characteristics, and (b) examine how well the relationships between adolescent smoking practices, and the social networks of closest friendships, can be used to predict smoking behaviors.

Select components of the social development model (SDM), as described by Catalano & Hawkins (1996), will guide this research. While a comprehensive description of the SDM is beyond the scope of this document, the following summary highlights the model in relationship to our variables under study. The SDM postulates that human behavior is shaped by three major influences: (1) social paths, (2) environmental influences [i.e., endogenous and exogenous] on individuals', and (3) external constraints. Theoretically, social paths can be either *prosocial* or *antisocial*, and refer to a person's ability to bond with immediate socializing units (e.g., parents, peers, school, or community members). The antisocial path (e.g., bonding with those who smoke) was measured using one item: "Of your three best friends, how many smoke at least one cigarette per day?" The wording of this item is significant to the SDM in that it assesses closest friendship pattern, and not merely observable smoking among other acquaintances. The *endogenous influences* (e.g., cognitive ability, personal biological systems that may arouse smoking) and *exogenous influences* (e.g., social structure variables of gender, race, age, and socioeconomic status) lead to complex interactions affecting healthful human development. Only the exogenous influences (i.e., demographic characteristics) contained within the environmental influences were used in this study. Fleming, Catalano, Oxford, and Harachi's (2002) recent research on the generalizability of the SDM across gender and income groups supports the effect of demographic influences. For example, these researchers noted that among three waves of longitudinal data from elementary aged developmental periods, the exogenous influences of gender and socioeco-

nomic status were the same for boys and girls as well as low-income and non-low income in terms of explaining the etiology of problem behaviors, such as substance use (pp. 423, 437). The six following demographic items were selected for inclusion in our research to complement the SDM's exogenous influences: "What is the date of your birth?" "What grade are you in?" "What is your race?" "How many hours of part-time work are you engaged?" "What is your total family income?" and "Is {NAME} male or female?" The *external constraints*, as described by Catalano & Hawkins (1996), posit that those who possess strong bonds to the mainstream culture (e.g., parental disapproval of tobacco use, personally respecting tobacco laws, or deciding to adhere to safe and drug-free school policies) have stronger skills and the ability to avoid use. Items that link logically to the external constraints such as parental disapproval were not available in Wave I of the Add Health protocol, and therefore can not be presented or discussed further.

METHODS

SAMPLING

The National Longitudinal Study of Adolescent Health (Add Health) was funded by the National Institutes of Child Health and Human Development, and supervised by the National Opinion Research Center. A complete description of these research procedures has been documented previously (Bearman, Jones, & Udry, 1997; Kelley & Peterson, 1998; Torangeau & Shin, 1999). Add Health was conducted to measure the effects of family, peer group, school, neighborhood, religious institution, and community influences on a variety of health risks including tobacco, drug, and alcohol use. The primary investigators involved in Add Health (Torangue & Shin, 1999) describe the design and procedures for selecting schools, calculations of sample weights, and procedures to adjust for non-responses. These authors described an implicit stratification procedure whereby "it was ensured that this sample was representative of U.S. schools with respect to region of country, urbanicity, school type, ethnicity, and school size" (p. 2). The research design and procedures used for forming the nationally representative sample involved multiple phases. Initially a cluster sampling of 132 schools, which had been stratified by region, residential location, school type, school size, and ethnic ratio, was organized into Primary Sampling Units (PSUs). Second, a stratified random sampling procedure was employed to construct a nationally representative sample of 7th- through 12th-grade students who would participate in a brief In-School Survey (Bearman, Jones, & Udry, No Date). Next, each of the identified schools was stratified by gender and grade level, and 17 students from each strata were chosen, resulting in the selection of 200 adolescents from each of the 132 schools. The complex sampling design of the study is reflected in the use of population weights in the analyses reported herein.

PARTICIPANTS

More than 90,000 students responded to the primary In-School Survey. From those 90,000 adolescents who were enrolled in 132 middle and high schools, and with the use of student rosters provided by the participating schools, 12,105 adolescents completed a secondary, more in-depth In-Home Survey constituting the "Wave I In-Home Core." One-half of the In-Home Core sample (n = 6,054) plus an oversampling of approximately 450 "well-educated African Americans" was combined and later released as the In-Home Public Use Data Set. The complex sampling design used in this is accounted for in the data by differentially weighting each subject on the basis of age and gender, and can be fully accounted for by using PSUs and strata information in conjunction with design weights (Torangeau & Shin, 1999). Unfortunately, however, the required data elements were not released in the public-use version of the dataset. Consequently, the sampling effect was accounted for by using a sample weighting and clustering technique provided by the dataset vendor, Sociometrics, that "allows for adequate approximation of the standard errors of those responding to the interview"(E. McKean, personal communication, December 20, 2002).

The following research results reflect the tobacco use items extracted from Wave I of the Add Health Public Use In-Home Survey data set. While these data were made available to researchers in the late-1990s, the merits of Add Health remain clear. As one of few national research projects to measure social connections to adolescent health, data of this nature provides confirmatory evidence leading to "best educational practices" for the primary and secondary prevention of tobacco use among adolescents. As reported previously (Maney, Higham-Gardill, & Mahoney, 2002), the Add Health data offers a nationally representative cohort of adolescent health behavior, which is significant to professionals working with adolescent populations in schools, communities, and family services organizations, in that it is truly representative and not merely cross-sectional evidence. Ultimately, data of this nature may inform community and school health educators about the best ways to consider the design, implementation, and evaluation of future tobacco prevention programming endeavors.

INSTRUMENTS

The Add Health questionnaires were developed and validated by a team of experts following comprehensive research, consultation with specialists on adolescent health and human development, and pilot-testing (Bearman, Jones, & Udry, 1997; Kelley & Peterson, 1998; McKean, personal communication, December 20, 2002; Torangeau & Shin, 1999). In-Home Survey data collectors completed three days of training that involved mock interviews and practice entering data into laptop computers. During data collection, the interviewer read aloud the less-sensitive questions and entered the respondents' answers. The more-sensitive questions, however, were presented to participants via audiocassettes and earphones, thereby enabling confidentiality and improving the validity of responses. For example, respondents listened to more sensitive questions, and were instructed to personally enter their responses directly into laptop computers (Blum & Mann, No Date). Thus, the potential for interviewer or parental bias was minimized.

DATA ANALYSIS

The Add Health Public Use "weighted dataset" was used because it produced the truest estimates of the U.S. population of students enrolled in grades seven through 12 (McKean, personal communication, December 20, 2002; Torangeau & Shin, 1999). Consequently, the methodological strategies suggested by survey research experts Winship and Radball (1999) were employed during data analysis to account for multiple variables as well as for sources of variance. For the purpose of this secondary analysis, therefore, 13 closed-end questions were used to explore the following two research foci. First, what are the linear relationships between select demographic characteristics and self-reported involvement in cigarette smoking of American adolescents? Second, what is the relationship between friendship networks, as identified by self-reported number of closest friends who smoke cigarettes, and the cigarette smoking practices of American adolescents? The tobacco use items included measures such as: (1) ever having tried cigarette smoking, (2) age at which smoking first occurred, (3) regularly smoking, (4) age of first regular smoking, (5) daily smoking within the past month, and (6) number of cigarettes smoked daily within the past month.

Two smoking behavior questions to assess ever smoking and regular smoking were presented in a dichotomous format (i.e., yes or no): "Have *ever tried smoking*, even 1-2 puffs?" or "Have *ever smoked regularly*, that is, at least one cigarette every day for 30 days?" The remaining four smoking behavior items used interval-scaled response options asked, "How old were you when you started smoking cigarettes for the *first time*?"; "How old were you when you first started smoking cigarettes *regularly*?"; "During the past 30 days, on *how many days* did you smoke cigarettes?"; and "During the past 30 days, on the days you smoked, how many cigarettes did you *smoke each day*?"

Adolescents' smoking behavior was considered during the first phase of analysis in terms of their demographic characteristics (i.e., gender, grade level, hours employed per week, and friendship networks). Descriptive statistics, multi-linear regression, and binomial logistic regression analyses were the statistical procedures applied to the data during the second phase of analysis. Data were analyzed using the computer software program "Stata," which was used to correctly account for the complex sampling design of the Add Health study. Statistical significance was set at a probability of .001, given the very large sample size. Population weights were used in all analyses to account for the complex sampling design of the Add-Health Study.

RESULTS

DEMOGRAPHICS

Descriptive statistics for all 6,504 responding adolescents revealed that a nearly equal proportion of respondents were adolescent girls (51.6%; $n = 3356$) as were adolescent boys (48.4%; $n = 3,147$). Approximately one-third of respondents noted residential location as suburban (36.4%; $n = 2,344$) or urban (32.0%, $n = 2,061$), while slightly more than one-fourth said rural location (27.9%; 1,794). With regard to racial composition, nearly two-thirds of respondents were Caucasian (64.3%, $n = 4,172$), and nearly one-fourth were African American (24.4%, $n = 1,584$). Grade level was very equally represented with approximately 15% of respondents represented in each grade level seven through 12.

CIGARETTE SMOKING BEHAVIORS

As shown in Table 1, over half (56.8%; n = 3,586) of adolescents had ever tried smoking. Likewise, nearly half (48.2%; n = 1,285) of adolescent smokers noted regularly smoking cigarettes, meaning smoking one cigarette per month during the last year. With regard to daily smoking within the past month, most of the regular smokers reported they either smoked on fewer than five days monthly (19.2%; n = 548), or 26 or more days monthly (26.0%; n = 661). The majority (73.1%; n = 1,251) of regular smokers consumed fewer than 10 cigarettes per day. Finally, nearly one-half of respondents said either one (20.4%), two (12.5%), or three (13.1%) of their *three closest friends* smoked one or more cigarettes daily.

The means and standard errors for the demographics and smoking variables also are presented in Table 2, including response ranges. Again, the reader should recognize that these averages are based on the total number of adolescents responding to any one item. Therefore, throughout the regression analyses shown in the following sections, average estimates of smoking behavior will vary due to the "list-wise deletion of cases," a function of Stata statistical software program.

As shown in Table 2, most respondents were between age 14 and 15 ('x = 14.76, SE = 0.12) and had between zero and one friend who smoked ('x = .85, SE = 0.03). The average age at which respondents smoked their first whole cigarette was 10.07 (SE = 0.17). The average age when respondents became regular smokers was 13.67 (SE 0.10). These regular smokers also reported to have smoked on an average of 10.58 days within the past month (SE 0.39) and an average of 6.70 cigarettes per day (SE = .26).

A series of regression analyses was completed to identify which variables best predicted smoking behavior. Prior to the regression analysis, a series of Pearson's Correlations was calculated for all of the independent and dependent research variables. When more than two variables are highly intercorrelated, colinearity makes it inappropriate to conclude that any change in the model's variance is related to the contri-

Table 1. Frequencies of Tobacco Use

VARIABLE		Unweighted		Weighted	
		N	P	N	P
Ever Tried Smoking Cigarettes					
	No	2863	44.4%	2863	43.2%
	Yes	3586	55.6%	3586	56.8%
	Total	6449	100.0%	6449	100.0%
Regularly Smoked Cigarettes*					
	No	1477	53.5%	1477	51.8%
	Yes	1285	46.5%	1285	48.2%
	Total	2762	100.0%	2762	100.0%
Daily Smoking within Past Month**					
	Zero Days	1081	39.6%	1081	38.9%
	1-5 Days	548	20.1%	548	19.2%
	6-10 Days	151	5.5%	151	5.4%
	11-15 Days	126	4.6%	126	4.7%
	16-20 Days	93	3.4%	93	3.4%
	21-25 Days	68	2.5%	68	2.4%
	26-30 Days	661	24.2%	661	26.0%
	Total	2728	100.0%	2728	100.0%
Number of Cigarettes Smoked Per Day***					
	Zero	55	3.3%	55	3.5%
	1-10 per day	1251	75.7%	1251	73.1%
	11-20 per day	287	17.4%	287	18.8%
	21-30 per day	39	2.4%	39	2.6%
	More than 30 per day	21	1.3%	21	1.4%
	Total	1653	100.0%	1653	100.0%
Closest Friends Who Smoke One or More Cigarettes Daily****					
Zero	3518	55.2%	3518	54.0%	
	One	1292	20.3%	1292	20.4%
	Two	773	12.1%	773	12.5%
	Three	789	12.4%	789	13.1%
	Total	6372	100.0%	6372	100.0%

* Has smoked one cigarette every day for past 30 days,

** Includes only those who regularly smoked (n = 2,728)

*** Non-categorical estimates: daily number of cigarettes smoked: 'x = 10.58, SD = 20.55, Range = 0-60

**** Of three closest friends, total number who smoke

Table 2. Mean Item Scores and Standard Deviations of Selected Demographics and Tobacco Use.

Variable	Sample f	Population f	Range [a]	X	SE
Gender[b]	6502	6502	0-1	.51	0.01
Grade Level[c]	6337	6502	7-12	9.44	0.11
Age[d]	4734	4734	10-19	14.76	0.12
Hours Employed per Week[e]	6423	3502	0-6	2.03	0.07
Regular Smoking of Closest Friends[f]	6372	6369	0-3	0.85	0.03
Ever Tried Smoking, Even 1-2 Puffs[g]	6449	6442	0-1	.56	0.50
Age Smoked First Whole Cigarette[h]	3553	3627	0-19	10.07	0.17
Age Became a Regular Smoker[i]	1279	1384	0-18	13.67	0.10
Total Days Smoked per Month[j]	2728	2850	0-30	10.58	0.39
Practices Regular Smoking[k]	2762	2881	0-1	0.48	0.01
Number of Cigarettes Smoked per Day / Month[l]	1653	1751	0-60	6.70	0.26

[a]Scoring Range
[b]0 = Female, 1 = Male
[c]7 - 12
[d]0 Years - 19 Years
[e]0 = 1-5, 1 = 6-10, 2 = 11-15, 3 = 16-20, 4 = 21-25, 5 = 26-30, 6 = 31 or more
[f]0 = None, 1 = One, 2 = Two, 3 = Three
[g]0 = No, 1 = Yes
[h]0 - 19 Years
[i]0-18 Years
[j]0 - 30 Days
[k]0 = No, 1 = Yes

bution of one variable alone. Table 3 illustrates that only one set of variables was highly intercorrelated: "total days smoked per month" and "practices regular smoking" ($r = .67^{***}$). In these analyses, the two constructs served as separate dependent variables, and therefore were not entered simultaneously into the regression models. Thus, co-linearity could not pose a problem. In addition, the dependent variable "days smoked within the past month" and independent variable "three closest friends who smoke" were moderately intercorrelated ($r = .51$). Again, these two constructs were never simultaneously entered into any of the regression models as independent variables, and for that reason did not pose a risk to the predictive validity of the models described below.

EVER-TRIED SMOKING

The use of the dichotomous dependent variable, "ever having tried smoking," dictated the use of Binomial Logistic Regression Analysis. Results showed that the combined effect of gender, grade level, regular smoking of closest friends, and hours employed per week explained a significant ($F[4, 128] = 88.68, p < .001$) amount of the variance in the category "ever having smoked cigarettes" (See Table 4). Although gender was not a significant predictor for ever having tried smoking (Odds Ratio [*OR*] = .98, $p = .82$), two of the three findings generated within this model were both significant and intuitive. First, adolescents in upper grade levels were 16% ($OR = 1.16, p < .001$) more likely to have ever tried smoking than those in lower grade levels. In addition, those who had one or more closest friends who reported regular smoking were twice ($OR = 2.03, p < .001$) as inclined to have ever smoked than adolescents who said none of their three closest friends were regular smokers. Finally, those employed greater hours weekly were 6% more likely to have ever tried smoking cigarettes, a finding that while small remained as significant ($OR = 1.06, p < .001$).

PRACTICES REGULAR SMOKING

The next logistic regression model, which uses the same independent variables excluding gender, produced similar results. As shown in Table 5, a significant amount of the variance in regular smoking was explained by the combined effects of grade level, hours employed per week, and regular smoking of closest friends ($F([3, 127] = 121.44, p < .001$). Using this model to predict regular smoking reveals that those in upper grade levels were 19% more likely to smoke regularly than those in lower grade levels ($OR = 1.19$,

Table 3. Pearson's Correlation Matrix of Research Variables

Variable	1	2	3	4	5	6	7	8	9	10
1 Gender	1.00	0.00	0.01	-0.05***	-0.02	-0.02	-0.02	0.03	-0.02	0.00
	(6502)	(6337)	(4928)	(4732)	(6422)	(6371)	(3552)	(1279)	(2727)	(2761)
2 Grade Level		1.00	0.06***	0.91***	0.28***	0.16***	0.21***	0.46***	0.15***	0.14***
		(6337)	(4803)	(4672)	(6268)	(6218)	(3458)	(1229)	(2647)	(2679)
3 Family Income			1.00	0.03*	-0.01	-0.04**	-.06**	0.12***	-0.01	-0.01
			(4929)	(3635)	(4877)	(4840)	(2676)	(950)	(2038)	(2063)
4 Age				1.00	0.27***	0.19***	0.21***	0.43***	0.16***	0.15***
				(4734)	(4689)	(4657)	(2533)	(831)	(1915)	(1937)
5 Hours Employed/Week					1.00	0.11***	0.11***	0.16***	0.15***	0.10***
					(6423)	(6313)	(3520)	(1267)	(2703)	(2734)
6 Regular Smoking Closest Friends						1.00	0.27***	0.03	0.51***	0.43***
						(6372)	(3512)	(1275)	(2708)	(2728)
7 Age Smoked First Whole Cigarette							1.00	0.61***	-0.10***	-0.12***
							(3553)	(1277)	(2707)	(2733)
8 Age Became Regular Smoker								1.00	0.10***	.[a]
								(1279)	(1268)	(1279)
9 Total Days Smoked/Month									1.00	0.67***
									(2728)	(2728)
10 Practices Regular Smoking										1.00
										(2762)

[a]Cannot be computed because at least 1 of the variables is constant; *p < .05, **p < .01, ***p < .001

Table 4. Logistic Regression: Ever Smoked a Cigarette on Select Demographics and Closest Friends' Tobacco Use

Variable	b	SE	t	OR	p	95% CI Lower	95% CI Upper
Gender	-.02	.06	-0.35	.98	NS	.87	1.11
Grade Level	.15	.02	6.77	1.16	***	1.11	1.22
Regular Smoking of Closest Friends	.81	.05	16.45	2.24	***	2.03	2.47
Hours Employed Per Week	.05	.02	3.20	1.06	***	1.02	1.09
Constant	-1.84	.21	-8.67				

NS = Not Significant at p < .001
*** p < .001
Observations = 6156
Strata = 1
Primary Sampling Units = 132
Population Size = 6148
F (4, 128) = 88.68, p < .001

$p < .001$), and those with one or more closest friends who smoked regularly were more than twice as likely ($OR = 2.28, p < .001$) to smoke regularly than those without such friends. Again, adolescents who were employed more hours were 4% more inclined to be regular smokers ($OR = 1.04, p < .001$) than those who were not employed.

NUMBER OF DAYS SMOKED IN PAST MONTH

Table 6 shows the results for predicting total number of days in which adolescents smoked during the past month. When using linear regression analyses to determine total days smoked monthly, the combined effects of gender, age, hours employed per week, and regular smoking of three closest friends were found to be significant ($F[4, 117] = 129.26, p < .001$) predictor variables. In fact, over one-fourth (27.55%) of the variation in the total number of days smoked during the past month was explained by the combined effects of these variables (adjusted $R^2 = .276$). The independent variable, regular smoking of three closest friends ($b = 5.15, p < .001$), was the strongest predictor of total days smoked within the past month, followed by age ($b = .78, p < .001$). The variable total hours employed weekly ($b = .43, p < .001$) also was a significant predictor of daily smoking over the past month, although it was much less influential than closest friends who smoked than age.

Table 5. Logistic Regression: Smoking on Select Demographics and Closest Friends' Tobacco Use

Variable	b	SE	t	OR	p	95% CI Lower	95% CI Upper
Grade Level	.18	.03	5.35	1.19	***	1.11	1.27
Hours Employed Per Week	.04	.02	1.72	1.04	NS	1.00	1.09
Regular Smoking of Closest Friends	.82	.04	18.59	2.28	***	2.07	2.47
Constant	-3.02	.35	-8.56				

NS = Not Significant at p < .001
*** p < .001
Observations = 2619
Strata = 1
Primary Sampling Units = 130
Population Size = 2736
F (3, 127) = 121.44, p < .001

Table 6. Linear Regression: Total Days Smoked per Month on Select Demographics and Closest Friends' Tobacco Use

Variable	b	SE	t	OR	p	95% CI Lower	95% CI Upper
Gender	.50	.27	.52	0.52	NS	-.75	1.29
Age	15.15	.78	.16	4.72	***	.45	1.10
Hours Employed Per Week	2.22	.43	.13	3.28	***	.71	.69
Regular Smoking of Closest Friends	1.29	5.15	.27	19.21	***	4.61	5.68
Constant		-10.00	2.43	-4.11		-14.82	-5.18

NS = Not Significant at $p < .001$
Days smoked monthly: $\bar{x} = 9.54$
*** $p < .001$
Observations = 1880
Strata = 1
Primary Sampling Units = 121
Population Size = 1886
$F\ (4, 117) = 129.26$, $p < .001$, $R^2 = 27.55\%$

Predicting total number of cigarettes smoked daily required the construction of a linear regression model using the Poisson technique. As shown in Table 7, the combined linear effect of gender, grade level, hours employed per week, and the regular smoking of closest friends explained a small percentage (10.86%) of the variance in total number of cigarettes smoked daily. As in previous regression models, the regular smoking of closest friends ($b = 2.06$, $p < .001$) emerged as the strongest predictor of cigarettes smoked daily. Those in upper grade levels ($b = 0.73$, $p < .001$) also were significantly more likely to smoke a greater number of cigarettes than those in lower grade levels.

DISCUSSION

Two variables emerged as the best predictors of smoking behavior among a nationally representative sample of adolescents: (1) number of closest friends who smoke, and (2) level of development as measured by grade level. Interestingly, however, when predict-

Table 7. Poisson Linear Regression: Number Smoked Daily on Select Demographics and Closest Friends' Tobacco Use.

Variable	b	SE	t	OR	p	95% CI Lower	95% CI Upper
Gender	0.52	1.43	.49	2.99	NS	0.48	2.38
Grade Level	9.92	0.73	.16	4.63	***	0.42	1.04
Hours Employed per Week	2.46	.0.07	.10	0.74	NS	-0.12	0.27
Regular Smoking of Closest Friends	1.77	2.06	.17	11.89	***	1.72	2.41
Constant		-4.75	1.52	-3.11	NS	-7.77	-1.73

Number of Cigarettes Smoked Daily: $\bar{x} = 7.07$, SE = .29, Range 1-60
NS = Not Significant at $p < .001$
*** $p < .001$
* $p < .05$
Observations = 1575
Strata = 1
Primary Sampling Units = 129
Population Size = 1667
$F\ (4, 125) = 45.43$, $p < .001$
$R^2 = 10.86\%$

ing the four types of smoking behaviors discussed above, gender never emerged as a significant predictor variable, and will be discussed below. The variable "number of closest friends who smoke" consistently performed as the strongest significant predictor of smoking behavior for each regression model: "ever having tried smoking" ($OR = 2.24, p < .001$), "practices regular smoking" ($OR = 2.28, p < .001$), "number of days smoked in past month" ($b = .5.15, p < .001$), and "number of cigarettes smoked in the past month" ($b = 1.37, p < .001$). The variable grade level, which was used in most of the models, also emerged as a significant predictor of most of the tobacco use behaviors analyzed: "ever tried smoking" ($OR = 1.16, p < .001$), "practices regular smoking" ($OR = 1.19, p < .001$), and "number of cigarettes smoked in the past month" ($b = 0.73, p < .001$). Another finding of note is that when the .001 level of probability was used to determine statistical significance, gender never significantly predicted smoking behaviors: "ever having tried smoking" ($p = .73$), "total days smoked per month" ($p = .02$), and "number of cigarettes smoked in the past month" ($p = .01$). Finally, although a statistically significant predictor of smoking, the variable "hours worked per week" was not practically significant and is not addressed in this discussion section. Following is a brief discussion of the findings summarized above in light of historical or contemporary research reports.

SMOKING BEHAVIOR OF CLOSEST FRIENDS

These results document that when adolescents' friends smoked, the respondents were clearly more likely to engage in one of several tobacco-smoking behaviors. This finding supports the antisocial pathways segment of the SDM and is consistent with previous national research reports (Burns & Johnson, 2001; USDHHS, 2000c; Everett, S. A., 1999; National Cancer Institute, 2001); further, the finding complements the Catalano and Hawkins (1996) premise that the antisocial pathways, such as "friendship networks," can lead to tobacco initiation and continuation. The Carnegie Council on Adolescent Development (1989) contends that when "freed from the dependency of childhood, but not able to find their own path to adulthood, many adolescents are surrounded only by equally confused peers" (p. 8).

This "blind leading the blind" scenario could be argued to predispose some adolescent to engage in tobacco initiation and continuance. As shown in our findings, when closest friends smoked, respondents were twice as likely to "ever smoke" and to become "regular smokers." Those interacting among smoking peers also were significantly ($p < .001$) more inclined to "smoke more days" on average than those whose peers did not smoke. Even when gender, grade level, and hours worked were controlled, the smoking behavior of closest friends emerged as the strongest predictor of total cigarettes smoked daily (Table 7). While parents have known intuitively that "falling into the wrong crowd" leads to increased likelihood for engaging in a variety of risky behaviors, prevention programming has failed to offset the very strong influence of friendship on tobacco use to date (National Cancer Institute, 2001).

As researchers, we appeal to parents, educators, community health professionals, and allied health care workers to acknowledge the magnitude that friendships have on adolescent tobacco initiation and continuance. Prevention specialists should incorporate into their planning the principle "if an adolescent's friend smokes, he or she is consequently significantly *at-risk* for tobacco smoking." Burns and Johnson's (2001) research adds merit to our findings regarding the influence of friendship: "Adolescents who report three or more friends who smoked had a smoking prevalence approximately 10 times that of adolescents who reported that none of their friends smoked" (p. 5). Therefore, federal health promotion and disease prevention agencies could best advance tobacco-related programming goals by developing and implementing prevention and education materials that focus more specifically on friendship networks. The National Highway Traffic Safety Administration's *friends don't let friends drive drunk* is one example of a successful public service announcement.

AGE

Our results documenting a high rate of "ever" smoking as well as "regular" smoking among adolescents confirm the importance of using planned, sequential, and developmentally appropriate tobacco prevention messages within homes, schools, and communities (Martza & Loyla, 1994; Botvin & Botvin, 1999). Over half (56.8%) of these adolescents had "ever tried smoking, even 1-2 puffs;" nearly half of those (48.2%) said they smoked regularly; and regular smokers were age 13.67 on average. The average age at which these respondents smoked their first whole cigarette was 10.07 ($SE = 0.17$). The CDC (2002) identifies younger smokers to be at greater risk for becoming strongly addicted to nicotine; "Of those who start using tobacco by age 11 many are addicted by age 14" (p. 2).

The very high rate of dependence among young tobacco smokers shows the importance for timing prevention messages at the earliest age possible. As a result, the CDC now recommends using the phrase "*take*

a stand early and often," to inspire educators, parents, coaches, and interested community members to practice tobacco prevention programming at the earliest stage possible. These prevention programs are especially critical today as young smokers are finding it very difficult to quit (Lamkin, Davis, & Kamen, 1998). Likewise, public health messages disseminated by federal agencies (USDHHS, 1997a; USDHHS 2000c) consistently warn against the use of tobacco products among younger populations. Tobacco use clearly compromises the health of young people (USDHHS, 1997b) as indicated in reports showing that only 5% of high school seniors who smoked daily thought they will be smoking in five years - - but almost 75% of them were still smokers 5 years later (p.2). Therefore, tobacco prevention messages must continue to operate within schools, communities, and homes along with meaningful learning opportunities focusing on refusal skills (Botvin & Botvin, 1997; USDHHS, 2000a).

GENDER

No significant gender differences emerged at the .001 level of probability when predicting smoking behaviors. This finding may appear less remarkable today because smoking rates between boys and girls are comparable after having been dramatically different in previous decades (Burns & Johnson, 2001). The lack of significant differences when predicting "ever smoking," "regular smoking," or "days smoked per month" also is consistent with present national trends, as reported by the U.S. Surgeon General (USDHHS, 2000a). Likewise, our results showing no gender differences for all tobacco use behaviors measured concurred with that of Fleming, Catalano, Oxford, and Harachi (2002), which illustrated the absence of gender and income differences as exogenous constraints when using the SDM to generalize about tobacco use behaviors among youth. Historically women have been less inclined to smoke regularly, but today there is a reversal in that trend, and reports show that in some instances adolescent girls smoke more than adolescent boys (National Cancer Institute, 2001).

The collaborative commitments of federal health agencies, such as the CDC (USDHHS, 2000b; CDC, 2002), the National Cancer Institute (2002), and the USDHHS (1997a; 2000b; 2000c) have led to large-scale awareness, and in some instances to the adoption (e.g., CDC) of the Coordinated School Health Program Model as a basis for prevention programming. The Surgeon General's Report (USDHHS, 2000a) stated that "school-based education programs are more effective when coupled with community-based initiatives that involve mass media and other techniques" (p. iii). Given these research results and in support of the coordinated school health program model by Martza & Loyla (1994), we recommend that school-based primary prevention programs targeting tobacco incorporate the following principles: (1) kindergarten through grade 12 instruction, (2) interactive instruction and videodisc interactive learning programs, (3) peer education to assist those dependent on tobacco products, (4) school and community partnerships to promote anti-smoking concepts, and (5) adherence to safe and drug-free schools laws. It has been shown that when educational strategies are implemented with community and media strategies combined, smoking onset can be prevented among 20% - 40% of all adolescents (USDHHS, 2000a). The endogenous and exogenous influences identified as important theoretical constructs by Catalano and Hawkins (1996) and supported recently in the Burns and Johnson (2001) research would be an a critical component of future prevention-based strategies in that (1) "there is a causal relationship between tobacco marketing and promotion," and (2) "tobacco control interventions can be very effective in reducing cigarette smoking among adolescents" (p.8). Using developmentally appropriate school- and community-based prevention messages, and providing early intervention services, help adolescents to appreciate that tobacco use is a truly injurious, addictive, and health-compromising behavior.

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HEALTH EDUCATION RESPONSIBILITY AND COMPETENCY ADDRESSED

Responsibility I: Assessing Individual and Community Needs for Health Education

Competency B: Distinguish between behaviors that foster and those that hinder well-being

Sub-competency 1: Investigate physical, social, emotional, and intellectual factors influencing health behavior