Self-Initiated Quitting among Adolescent Smokers

Steve Sussman, Ph.D.,* 2 Clyde W. Dent, Ph.D.,* Herbert Severson, Ph.D.,† Dee Burton, Ph.D.,‡ and Brian R. Flay, D.Phil.³

*Institute for Health Promotion and Disease Prevention Research, University of Southern California, Los Angeles, California 90033; †Oregon Research Institute and University of Oregon, Eugene, Oregon 97403; and ‡Prevention Research Center, University of Illinois at Chicago, Chicago, Illinois 60607

INTRODUCTION

Objectives. This paper reviews the literature regarding predictors of adolescent self-initiated smoking cessation and investigates self-initiated smoking cessation among a large sample of alternative high school youth in southern California. Youth transfer to alternative schools because of academic or behavioral problems, and they are at relatively high risk for cigarette smoking.

Methods. Several demographic (e.g., gender), behavioral (e.g., level of smoking), and psychosocial (e.g., risk-taking) predictors of adolescent smoking cessation were investigated. The alternative high school cohort provided a sufficient sample size of quitters (defined as no use in the past 30 days, measured after a 1-year period) to permit a prospective examination of adolescent smoking cessation.

Results. Although nine demographic, behavioral, or psychosocial variables discriminated among quitters and nonquitters in univariate analyses, only level of baseline smoking, smoking intention, and perceived stress were predictors in a final multivariable model.

Conclusions. Based on the literature review and findings among the cohort, smoking cessation programs for adolescents should include counteraction of problem-prone attitudes, support of wellness attitudes, provision of motivation to quit strategies, and assistance with overcoming withdrawal symptoms.

©1998 American Medical Association

Key Words: self-initiated smoking cessation.

1 This research was supported by the National Cancer Institute Grant CA44907, the National Institute on Drug Abuse Grant DA07601, and the California Tobacco-Related Disease Research Program Grant GRT-0182.

2 To whom reprint requests should be addressed at IPR-USC, 1540 Alcazar Street, CHP-209, Los Angeles, CA 90033. Fax: (213) 342-2601. E-mail: ssussma@hsc.usc.edu.

The recent upturn in smoking among high school seniors underscores the importance of continuing research to determine the factors that influence smoking cessation among adolescents. The rate of daily smoking decreased among high school seniors from 29 to 20% between 1977 and 1981, declined only 2% from 1981 to 1991, then increased nearly 1% per year thereafter [1,2]. As the earlier a person begins to smoke cigarettes the more likely it is that he/she will continue using them as an adult [e.g., 3-5], effective smoking cessation programs for adolescents are very much needed. Unfortunately, smoking cessation in this age group is poor: approximately 75% of teenage daily smokers will smoke as adults [1,5]. Sadly, some physical damage from smoking begins in adolescence [6,7], making cessation efforts even more important.

Many adolescents who smoke regularly want to quit [7,8]. Indeed, between 55 and 65% of smokers ages 12 to 18 years report having tried to stop. Percentages in this range have been reported in studies of comprehensive (regular) high school youth in the United States [9-12], in a study of smokers in U.S. youth detention centers [13], and in a national survey of Canadian youth [14]. A national survey found that approximately 45% of adolescent smokers wanted to quit "soon" [1], but this desire may not be grounded in a true intent to change behavior. For example, although 49% of a sample of 130 adolescent weekly smokers (9th through 12th grade) reported wanting to quit in the next 6 months, only 18% of the sample indicated they were ready to take action and quit in the next 30 days [15]. Identifying relevant variables to facilitate quit attempts has been considered important for some time [5,7,16,17] but needed research has not been completed.
Quit Attempts: Perceptions of Difficulty in Quitting Smoking

A wide range of reports have been obtained in which youth were asked about the ease of quitting smoking. Some studies [e.g., 18,19] indicate that youth believe smoking cessation to be quite easy; others show young people to be less sanguine. For example, in a Missouri state-wide survey [20], 23% of those who reported smoking in the past week reported it would be very difficult to quit. Similarly, in the CDC’s 1993 second Teenage Attitudes and Practices Survey, 18% of 10- to 18-year-old monthly smokers and 74% of daily users reported that it was “really hard to quit” [19]. A recent study [12] revealed that only 43% of a sample of 1,430 southern California adolescent smokers reported with confidence that they would ever quit smoking.

How ability to quit matches up with intentions to quit or beliefs about the ease of quitting are questions worth pursuing. In one study, approximately 5% of young smokers believed they would be smoking 5 years later, but at 8-year follow-up 75% were smoking [19]. It seems likely that differences in smoking behavior will influence perceptions of ease of quitting. Occasional, younger users could well imagine that quitting is easy since they experience either no withdrawal symptoms or only a few. On the other hand, regular smokers may express pessimism about the likelihood of stopping smoking [5,21]. The fact that withdrawal symptoms are present even among youth who smoke seven or fewer cigarettes per day [17,21,22] provides ample evidence of the strain of quitting for many teenage smokers.

Predictors or Correlates of Quitting

Some self-report cessation studies have investigated quitter–smoker differences; others have examined prospective predictors of quit status. In Table 1, a summary of the characteristics of 10 major prospective studies of self-initiated smoking cessation is presented. Predictors investigated in one or more of these studies include smoking history, demographic variables and alcohol use, reasons for quitting, and psychosocial variables pertaining to peers, adults, coping, rebelliousness, and antisocial attitudes.

Smoking history and intention to smoke in the future. Heavier smokers are less likely to quit than lighter smokers, and those who have smoked for a relatively long period are less likely to quit than those with a briefer experience [8,9,16]. Furthermore, even controlling for self-reports of degree of tobacco dependence, those who begin smoking at a younger age are less likely to quit than those who started later [3]. Among adolescents, a greater number of quit attempts is associated with higher quit rates [16,23], but this correlation was not found in several studies of self-initiated cessation among adults [24]. Not surprisingly, intention to smoke in the future has been found to be inversely related to quitting [19]. Reports of relatively pleasant physiological reactions to tobacco, which predict escalation in use, also may be related to a smaller likelihood of cessation [21,25].

Demographic variables and alcohol use. Variables that have been studied in relation to quit rates among adolescents include age of initiation, gender, ethnicity, socioeconomic status, and alcohol consumption. Generally, if a wide range of ages (e.g., 12 to 20 years) is included, then younger age of initiation generally is associated with lower quit rates [8]. Female gender has been associated with lower smoking quit rates in some studies [8,20,26], but not in others [3,23,27].

White ethnicity has been associated with lower quit rates [1,2], but this relationship may be attributable to younger age of initiation [3]. In any event, by middle adulthood (35 to 60 years) the rates for the white subpopulation are higher than for other groups (e.g., African Americans [28]). Finally, lower socioeconomic status has been associated with lower quit rates [e.g., 26].

A study on drug use found that quitters are more likely than those who do not quit to report not drinking alcohol in the past month [29]. However, another study failed to find any relationship between use of drugs other than nicotine and quit status [e.g., 9]. One may conjecture that persons who are less reliant on drug use for functioning will be more likely to quit smoking; however, those who quit use of other drugs also may be relatively likely to remain a smoker in recovery—perhaps considering it an immediately more safe alternative [30].

Reasons for quitting. Various health effects are frequently cited in retrospective reports of adolescents as reasons for quitting [18,13,31,32] or as a reason for wanting to quit [12,33]. Social reasons including perceived peer and family pressures to quit also are mentioned frequently [12,13,32]. Intrapersonal reasons, which include personal estimates of cost and addiction, are also cited frequently [12,32,33].

Peer influence. Frequency of cigarette offers, perceived use among friends, peer approval if one smokes, enforcement of peer norms, estimates of the prevalence of peer smoking, and endorsement of smoking-related social images (e.g., smoking to show one is a sensation seeker) have all been examined for their effects on quit rates. It appears that direct social influence may vary by age as a predictor of smoking considering that greater motivation to comply with peer requests appears negatively related to quitting among middle school youth, as might be expected, but it is positively


related to quitting among high school youth [34]. Perhaps fewer peers make direct offers of cigarettes in high school, or more youth may verbally discourage use. It is known that those youth who report receiving a relatively greater number of cigarette offers are less likely to quit [9].

Quit rates are lower among adolescents who report use among friends [e.g., 9,16,26,29,34–37], with one exception in the literature [38]. Correspondingly, peer approval of smoking is related to lower quit rates for middle school youth [34]; the effect on quit rate for high school youth remains to be determined. The perception that friends are relatively less strict about standards of behavior has been found to be marginally predictive
of quitting [34], which may seem counterintuitive. Overestimates of smoking among one’s peers has been hypothesized to be inversely related to quitting, but this hypothesis has not been confirmed [38]. Finally, higher quit rates or decreases in smoking have been found in some studies for those holding less favorable smoking-related social images [23], but not in others [35,39].

Family influence. Family use, family disapproval of use, and family social support have all been studied as correlates of cessation. Family use is associated with lower quit rates among young adult smokers [40], among daily or monthly adolescent smokers [26,29,38], and, when father's use only was considered, among experimental adolescent smokers [36]. On the other hand, parental smoking was associated with greater quitting among adolescent experimental smokers in the 1982 Surgeon General’s report [16].

Parental disapproval of smoking predicts quitting, especially among younger smokers [34]. Finally, perceived parental social support has been found to predict quitting among middle school youth, a finding that still held at 7-year follow-up [34,38]. Attachment to father and greater parental supervision are associated with higher quit rates [36], and greater perceived parental expectation for one's academic success predicts quitting [38].

Coping and rebelliousness. Because cigarette smokers often describe the habit as a stress reducer, the relationship of adolescents’ stress management skills to their smoking behavior is an important area for investigation. Unfortunately, most of the research on coping with stress and smoking cessation has been conducted among adults. Among young people, researchers have found that lower levels of emotional distress and greater coping and social skills are related to higher quit rates [41,42]. Correspondingly, levels of self-esteem are related to quitting among adolescents [23].

Risk-taking, not believing in obeying the law, and lack of religiosity all consistently predict who becomes and remains a long-term smoker [e.g., 36,43]. In addition, failure to participate in organized activities at school or elsewhere in the community has been found to be associated with lower quit rates later in life [26].

Attitudes about smoking. Researchers have examined the impact of attitudes about the morality of smoking, the importance that adolescents place on health as a value, and knowledge and beliefs about consequences of smoking. One prospective study found that smokers who agreed that society has the right to do something about smoking (e.g., “teachers should set a good example by not smoking cigarettes”) were more likely to quit [35]. Another study found that adolescents whose beliefs changed relatively more over time in the direction of thinking that cigarette and alcohol use were wrong had higher quit rates [36]. A third study found that disapproval of cigarette advertising was associated with greater quit rates [29]. Finally, other researchers have found that youth who self-identify as members of high-risk groups (in which 50% or more are regular smokers) are less likely to smoke, themselves, if they place importance on health as a value [37].

Health knowledge does not predict quitting [e.g., 26,32], even though quitters hold more negative beliefs than current smokers about the psychological and health consequences of smoking [38]. In summary, in the few studies that have been completed, attitudes unfavorable to continued smoking, and negative beliefs about the health effects of smoking, appear as consistent predictors of quitting among adolescents.

Self-Quitting among High-Risk Youth: Project TND

The present empirical study involves a longitudinal cohort of youth from 21 continuation high schools, 1 from each of 21 southern California school districts, who were administered both a baseline assessment and a follow-up assessment 1 year later (Project Towards No Drug Abuse, Project TND). Continuation high schools enroll youth who have transferred out of the regular system due to academic or behavioral problems (e.g., lack of credits, drug use) [44,45]. Approximately two-thirds of the students in the current study were exposed to drug abuse classroom prevention programming as part of other research but none were exposed to smoking cessation programming [44]. For this analysis, self-reported quitting was examined while controlling for other program involvement.

METHOD

Subject Selection

The continuation schools were all located in a five-county region of southern California. The total baseline sample of 2,001 consisted of 423 students who underwent an anonymous collection procedure and 1,578 students who were to be tracked confidentially but individually over time. The anonymous subjects, 217 (51%) of whom reported smoking in the past month at baseline, were those for whom parental consent was not obtained for individual-level longitudinal measurement. The present longitudinal study included only those who received the confidential collection procedure; anonymous and confidential collection students did not differ on baseline characteristics [46].

All participating subjects were asked at baseline whether they had smoked in the past month (30 days); of the confidential collection baseline sample, 889 (56%) reported they had. The present study further examined 593 (67%) of these smokers, all of whom were followed...
up 1 year later. An attempt was made to follow up at 1 year all 889 current smokers in the confidential collection group, often making repeated attempts. Success was achieved in reaching at school 136 subjects (approximately 15% of the targeted sample). Success was achieved in reaching by telephone the homes of 61% of the targeted sample (after a mean of seven attempts to reach them, SD = 7.5, to an average of 1.6 telephone numbers, SD = 1.0). In all, 3% of the youth or their parents refused to continue participation after they were finally reached by telephone. Another 6% of the students in the targeted sample were not available for interview (either they or their family had been reached at least once but the subject was not available at those times for the interview). Thus, success was achieved in following up 67% of the targeted sample, a rate only slightly lower than that obtained with samples from traditional schools at 1-year follow-up (75%) [32].

Current Smoking and Quit Measure

Those who reported any cigarette smoking within the past 30 days were classified as current smokers [e.g., 38]. An 11-category rating scale was used to assess smoking and other drug use (see Table 2). Subjects were asked, “How many times have you used each of these drugs in the last month? (In the last 30 days).” Definitions of cessation must include a measure of the duration of quitting. Generally, adult and adolescent smokers smoking less than one cigarette in the past month are classified as ex-smokers [8,16,24]. The baseline current smoking item and the 1-year follow-up time points were used to create two smoking status categories: those who reported having smoked in the past 30 days at baseline but not at follow-up were classified as “quitters,” and those who reported smoking at both time points were considered “nonquitters.” Both samplesizes of quitters and nonquitters were large enough to execute a series of regression models that predicted quit status from various of baseline variables.

Subjects

For the 593 subjects who reported smoking at baseline and who were surveyed 1 year later (the analysis sample), ages varied from 14 to 19 years; 93% were 16 to 18 years of age (mean age = 16.7 years, SD = 0.8). The sample was 58% male; 41% were white, 42% Latino, 6% Asian American, 4% African American, 3% Native American, and 4% “other”; 45% used both English and another language, although only 1% reported a preference for a second language; and 46% lived with both parents. Of the youths’ parents, 65% had completed

<table>
<thead>
<tr>
<th>Measure</th>
<th>Number of items in measure</th>
<th>Number of response options for each item in measure</th>
<th>α or r of measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethnicity</td>
<td>6</td>
<td>2 each</td>
<td>—</td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>Derived from birth date</td>
<td>—</td>
</tr>
<tr>
<td>Gender</td>
<td>1</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>4</td>
<td>6 to 9</td>
<td>0.68</td>
</tr>
<tr>
<td>Live with both parents</td>
<td>1</td>
<td>2</td>
<td>—</td>
</tr>
<tr>
<td>Acculturation</td>
<td>4</td>
<td>5 each</td>
<td>0.89</td>
</tr>
<tr>
<td>Current smoking</td>
<td>1</td>
<td>11</td>
<td>—</td>
</tr>
<tr>
<td>Smoking intention</td>
<td>1</td>
<td>5</td>
<td>—</td>
</tr>
<tr>
<td>Current alcohol use</td>
<td>1</td>
<td>11</td>
<td>—</td>
</tr>
<tr>
<td>Current marijuana use</td>
<td>1</td>
<td>11</td>
<td>—</td>
</tr>
<tr>
<td>Current hard drug use</td>
<td>5</td>
<td>11 each</td>
<td>0.82</td>
</tr>
<tr>
<td>Addiction concern</td>
<td>2</td>
<td>2 each</td>
<td>r = 0.63</td>
</tr>
<tr>
<td>Friends’ cigarette use</td>
<td>1</td>
<td>6</td>
<td>—</td>
</tr>
<tr>
<td>Peer approval of drug use</td>
<td>3</td>
<td>4 each</td>
<td>0.79</td>
</tr>
<tr>
<td>Prevalence estimates of peer smoking</td>
<td>1</td>
<td>11</td>
<td>—</td>
</tr>
<tr>
<td>General assertiveness</td>
<td>5</td>
<td>2 each</td>
<td>0.48*</td>
</tr>
<tr>
<td>Family conflict</td>
<td>4</td>
<td>2 each</td>
<td>0.56</td>
</tr>
<tr>
<td>Fear of victimization</td>
<td>4</td>
<td>4 each</td>
<td>0.81</td>
</tr>
<tr>
<td>Morality of drug use</td>
<td>2</td>
<td>4 each</td>
<td>r = 0.59</td>
</tr>
<tr>
<td>Sensation seeking</td>
<td>11</td>
<td>2 each</td>
<td>0.75</td>
</tr>
<tr>
<td>Health as a value</td>
<td>3</td>
<td>7 each</td>
<td>0.59</td>
</tr>
<tr>
<td>Perceived stress</td>
<td>3</td>
<td>2 each</td>
<td>0.68</td>
</tr>
<tr>
<td>Depression</td>
<td>20</td>
<td>4 each</td>
<td>0.88</td>
</tr>
<tr>
<td>Program success expectancies</td>
<td>4</td>
<td>3 each</td>
<td>0.84</td>
</tr>
</tbody>
</table>

* Individual items were examined if α < 0.50; —, not applicable to this item.
high school; modal occupations among the fathers were skilled or semiskilled labor (42%), among the mothers, unskilled labor or housework (32%). Use of alcohol, marijuana, and hard drugs in the past month was reported by 78, 71, and 45% of the sample, respectively, indicating that this group of adolescents had a higher prevalence of drug use than high school youth from nearby schools or high school youth nationwide [45].

Data Collection

At baseline, all subjects were administered a 20-page self-report questionnaire, which had a core section at the front, containing items designed to elicit demographic and behavioral information, followed by knowledge and psychosocial items. The same type of questionnaire was administered 1 year later. To be conservative, a biochemical validation protocol (a pipeline procedure) was used [32]. Because self-reports of cigarette use of students receiving this procedure did not differ from those of anonymously surveyed students [46], the self-reports were used in the analysis.

During the 1-year follow-up data collection, for subjects who were still enrolled at their high school, data collectors traveled to the school to survey them there (23% of those surveyed). Most subjects (77%), however, were surveyed by telephone. Whether or not the subject could be reached, the maximum time spent trying to follow up a subject from a given school was 4 months, which included first tracking the subject at school and then outside of school.

Predictor Measures

Four classes of baseline predictors were examined in models that predicted nonquitters versus quitters. The first class consisted of demographic measures: binary-coded ethnic comparisons (each group compared with all others), age, gender, socioeconomic status, living situation, and acculturation. A parental socioeconomic status (SES) index (across mother and father) was created; the index adapted the occupational and educational categories of Hollingshead and Redlich [32,47]. The assigned SES index was the mean across the four items (two for each parent). An acculturation index, based primarily on language of preference and developed by Marin and colleagues [48], was modified slightly for use in this study.

The second class of baseline predictors included measures related to current drug use: current cigarette smoking (previously defined), smoking intention, alcohol use, marijuana use, hard drug use [45], and addiction concern [49]. Included in the third class of baseline predictors were perceived social variables: friends' cigarette use, peer approval of drug use, prevalence estimates of peer smoking [32], general assertiveness (derived from Gambrill and Richey's measure [50]), family conflict [32], and fear of victimization (adapted from Jensen and Brownfield [51]).

The fourth class of baseline predictors included variables related to individual differences: morality of drug use [52], sensation seeking (Zuckerman's impulsiveness subscale [53]), health as a value [37], perceived stress (derived from the Perceived Stress Scale [54]), depression [55], and program success expectancies [32]. Health as a value was originally tested by Lau et al. [56]. Depression was measured as the mean of the scores on the 20-item Center for Epidemiological Studies—Depression Scale [55].

A description of the measures used for Project TND is provided in Table 2. For measures with three or more items, a coefficient $\alpha$ is provided. For those with two items, a correlation ($r$) is given.

ANALYSIS AND RESULTS

Attrition

To assess the potential bias introduced by failure to obtain parental consent for tracking and inability to follow up some of the consented subjects, the baseline means for the analysis subsample of smokers were compared with those for the full measured baseline sample of smokers by using a series of single-sample t tests. There were few statistically significant differences found between the means of those measured at both occasions (n = 593) and the means of all those measured only at baseline (anonymous and confidential collection combined n = 1,106). Regarding the measures examined in this study, the only differences were that subjects in the analysis sample were slightly less likely to be from single-parent homes and slightly more likely to be hard drug users, but these differences were very small in magnitude (less than 0.04 standard deviation units). Thus, the primary results probably would generalize to the general population of continuation high school smokers. To test whether the sample selection restrictions on these two variables led to model specification bias, the adjustment method suggested by Heckman was used [57]. All models described below were run with and without the adjustment factor, but results failed to differ after this adjustment.

Prediction of Quitting at Follow-up

The overall quit rate at follow-up (percentage that did not smoke in the past 30 days) for the final study sample of 593 baseline smokers was 21%. Quit status (yes or no) was predicted with a random regression model (PROC MIXED) procedure [58]. Linear regression results are equivalent to logistic regression in this analysis because more than 20% of the sample were quitters. The intraclass correlation for schools was...
small (0.002). A two-stage analysis protocol was completed. The dependent variable was always quit status. The first set of models examined the prediction of quit status from single predictors while controlling for nuisance factors (prevention study condition [59], schools, and collection method). In the second stage, all significant predictors from the previous stage were placed in the same simultaneous model (significance for this purpose was considered to be $P < 0.1$).

First-Stage Models

These results are shown in Table 3. For ethnicity, two of the six regression models were significant: Latinos were more likely to quit than other groups (58% of the quitters were Latino, and 39% of the nonquitters were Latino), and whites were less likely to quit than others (24% of the quitters were white, and 38% of the nonquitters were white).

<table>
<thead>
<tr>
<th>Measure</th>
<th>Partial $r^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
</tr>
<tr>
<td>Latinos</td>
<td>0.16*</td>
</tr>
<tr>
<td>Whites</td>
<td>0.16*</td>
</tr>
<tr>
<td>African Americans</td>
<td>0.03</td>
</tr>
<tr>
<td>Asians</td>
<td>0.09</td>
</tr>
<tr>
<td>Native Americans</td>
<td>0.03</td>
</tr>
<tr>
<td>&quot;Others&quot;</td>
<td>0.03</td>
</tr>
<tr>
<td>Age</td>
<td>0.02</td>
</tr>
<tr>
<td>Gender</td>
<td>0.04</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>0.05</td>
</tr>
<tr>
<td>Live with both parents</td>
<td>0.04</td>
</tr>
<tr>
<td>Acculturation</td>
<td>0.04</td>
</tr>
<tr>
<td>Drug use</td>
<td></td>
</tr>
<tr>
<td>Baseline smoking</td>
<td>0.36*</td>
</tr>
<tr>
<td>Smoking intention</td>
<td>0.02</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>0.02</td>
</tr>
<tr>
<td>Marijuana use</td>
<td>0.04</td>
</tr>
<tr>
<td>Hard drug use</td>
<td>0.04</td>
</tr>
<tr>
<td>Addiction concern</td>
<td>0.07*</td>
</tr>
<tr>
<td>Perceived social variables</td>
<td></td>
</tr>
<tr>
<td>Friends' cigarette use</td>
<td>0.12*</td>
</tr>
<tr>
<td>Peer approval of drug use</td>
<td>0.00</td>
</tr>
<tr>
<td>Prevalence estimates of peer smoking</td>
<td>0.03</td>
</tr>
<tr>
<td>Family conflict</td>
<td>0.00</td>
</tr>
<tr>
<td>Fear of victimization</td>
<td>0.03</td>
</tr>
<tr>
<td>Individual difference variables</td>
<td></td>
</tr>
<tr>
<td>Morality of drug use</td>
<td>0.10*</td>
</tr>
<tr>
<td>Sensation seeking</td>
<td>0.04</td>
</tr>
<tr>
<td>Health as a value</td>
<td>0.08*</td>
</tr>
<tr>
<td>Perceived stress</td>
<td>0.08*</td>
</tr>
<tr>
<td>Depression</td>
<td>0.06</td>
</tr>
<tr>
<td>Program success expectancies</td>
<td>0.12*</td>
</tr>
</tbody>
</table>

Note. The partial $r^2$ square is the percentage of variance accounted for by a variable, controlling for nuisance factors (prevention study condition, school, and method of collection).

Among the drug use-related variables, baseline smoking and smoking intention (both $P < 0.05$) and addiction concern ($P < 0.1$) were significant. The mean score of baseline cigarette smoking among quitters was 3.7 (30–40 cigarettes in the past month; SD = 3.7); among nonquitters the score was 6.9 (approximately 70 cigarettes in the past month; SD = 3.6). On likelihood of smoking in the next year, quitters (mean = 3.5, rated approximately as "a little likely"; SD = 1.4) had a lower mean score than nonquitters, whose mean score of 4.4 (SD = 1.1) was in the "somewhat" to "very likely" range. The mean score of baseline addiction concern, slightly lower among quitters, was 1.2 (SD = 0.4); among nonquitters the mean score was 1.4 (SD = 0.4).

Of the five perceived social variables, only the friends' cigarette use item was a significant predictor of quitting. Quitters reported a mean of 3.7 (of 5 closest) friends who smoked (SD = 1.6), nonquitters, a mean of 4.1 (SD = 1.3). Four of the six individual difference variables—morality of drug use, health as a value, perceived stress, and program success expectancies—were significant. Quitters had a lower mean score (mean = 2.4, SD = 1.0) on morality of drug use than did nonquitters (mean = 2.6, SD = 1.0); a lower score indicates a stronger belief in the immorality of drug use. Quitters also scored slightly higher on health as a value (mean = 1.5, SD = 0.3) than nonquitters (mean = 1.4; SD = 0.2). In addition, quitters had a slightly lower perceived stress score (mean = 1.4, SD = 0.4) than nonquitters (mean = 1.5, SD = 0.4). Finally, while the scores of both groups indicated that many of the subjects learned from school programs that year something they believed would help prevent their future drug use, quitters reported a higher mean level of confidence (mean = 2.0, SD = 0.6) than nonquitters (mean = 2.2, SD = 0.6); a lower mean indicates greater confidence.

Second Stage: Multivariable Model

All significant predictors (Latino ethnicity, white ethnicity, baseline smoking, smoking intention, addiction concern, morality of drug use, health as a value, perceived stress, and program success expectancies), as well as prevention study condition [59], an attrition composite variable, and method of collection, were entered in a simultaneous multivariable analysis. The significant predictors of quit status in this model were level of baseline smoking ($F \ [df = 1,557] = 30.19, P < 0.001$) and smoking intention ($F \ [df = 1,557] = 5.90, P < .015$). Method of data collection ($F \ [df = 1,557] = 3.65, P < 0.056$) and perceived stress ($F \ [df = 1,557] = 3.46, P < 0.063$) were marginally significant predictors.

DISCUSSION

Literature Review

The literature review indicates that demographic characteristics may help to distinguish quitters from
nonquitters (e.g., during adolescence, whites may be less likely to quit than members of other ethnicities), but available studies are inconsistent on this point. Behavioral predictors provide less equivocal data; clearly heavier smokers as well as those who have smoked for a relatively longer duration are relatively less likely to quit. Although not much work on the associations of other drug use and smoking cessation has been completed, it appears likely that entrenchment in a drug-using milieu is associated with lower rates of smoking cessation [30]. In addition, friends’ use has been found to be associated with quit rates: youth who perceive that their friends smoke may be less likely to quit. The literature review indicates that social variables such as overestimating the prevalence of smoking among one’s peers and endorsing favorable smoking-related images are not consistently related to quitting. Perhaps, reports of use by one’s primary peer clique is a less ambiguous measure of perceived social pressure to smoke or quit [37].

Finally, there is some support for the predictive efficacy of individual-difference variables. Relatively high emotional distress, few coping resources, or high risk-taking may be related to lower rates of quitting. The most consistent support exists for variables such as intention to smoke and relatively strong attitudes for or against cigarette smoking.

In summary, the review suggests that (a) heavier use and intention to continue using, (b) perceived friends’ use, (c) favorable attitudes toward continued use, and (d) a preference for risk-taking all predict continued cigarette smoking. Cessation programming should confront prosmoking attitudes, perhaps within cliques of smokers [37], should encourage quitting right away rather than doing so in middle adulthood, and should consider means tailored to help heavier smokers quit.

Project TND Data

The list of significant predictors found in the first-stage analysis of Project TND data suggests that (a) degree of involvement in smoking and (b) being part of an environment that supports smoking or other drug use or is perceived as stressful is inversely related to quitting. Generally consistent with the literature review, heavier smoking, intention to continue smoking, and greater perceived stress emerged as the main predictors of not quitting. Other variables, including not being Latino, being white, reporting greater addiction concern, friends’ smoking, greater attitudinal tolerance for drug use, less belief in health as a value, and lower expectations of school treatment program success in combating drug use failed to add to the prediction of quit rates beyond that supplied by smoking behavior and intention to smoke and perceived stress. Still, predictors that were significant in the first-stage models but not in the multivariable model may be of interest to those charged with developing cessation programs due to possible indirect effects on quitting.

The finding that method of data collection was of borderline significance deserves further discussion. Classroom self-report was associated with higher rates of quitting than was telephone report. This difference in reporting could be a collection artifact; perhaps those surveyed in class, believing themselves to be more closely monitored, were more likely to try to meet the imagined preferences of the data collection team. On the other hand, those surveyed confidentially versus anonymously in classroom at baseline did not differ in reports of smoking, probably ruling out a collection artifact. As an alternative interpretation of these results, all those interviewed by telephone were out of high school and may have been more stressed and thus more likely to continue smoking. Consistent with this interpretation, by removing the method of collection variable from the multivariable model, the stress variable regained traditional two-tailed significance (P < 0.046).

The fact that studies consistently find level of use or intention to predict quitting suggests that measures of tobacco dependence need more exploration among adolescents. The few dependence measures currently collected include self-reports of inability to quit [5] and reports of the presence of withdrawal symptoms [13,19,22]. Specific withdrawal symptoms frequently reported among adolescents include craving, irritability, insomnia, hunger, and difficulty concentrating [e.g., 13,21]. More than half of adolescent smokers who try to quit report withdrawal symptoms [7,13,17,22]; number of cigarettes usually smoked and self-reported depth of inhalation have been found to predict withdrawal symptoms among adolescents who smoke [22]. In one study, various other psychoactive substance dependence criteria from the Diagnostic and Statistical Manual of Mental Disorders—Third Edition Revised also were assessed, such as spending a great deal of time obtaining the substance, giving up important activities because of the substance, or continued use despite knowledge of adverse consequences [3]. Much more work is needed to ascertain the relations between measures of addiction and smoking cessation among adolescents.

Suggestions for Cessation Programming

Continuation high school students in California indicate an interest in lessons that can motivate them not to use drugs or justify why it is in their interest to learn new life skills [44]. Most continuation high school youth are well aware that other persons perceive them as even more deviant in behavior than they actually are; perhaps educators can motivate them to stop smoking.
as a way of rejecting the stereotypic view that these youth are "social undesirables." A second approach to smoking cessation proceeds from the fact that many smokers entertain upwardly mobile life goals and are well aware that ill health can interfere with achieving these goals. If asked, adolescent smokers may admit that good health is an important prerequisite for achieving life goals and that they should, therefore, quit smoking. Getting people to rebel against negative stereotypes and stressing the importance of good health to those who want to improve their lot in life, together with other motivational concepts [e.g., 60], may be taught through interactive dialogue with the health educator, through group games (e.g., a talk show format), or through motivational interviewing techniques. Through use of such techniques, smokers might be encouraged to quit immediately rather than wait until well into adulthood.

As these youth try to quit, they may need help in following through after their initial decision. To help heavier users, pharmacological adjuncts [61] as well as instruction in coping with cessation should be considered. Thorough instruction in withdrawal symptoms, including those likely to be experienced after the acute withdrawal phase, is needed. Also, during quit periods youth should be able to inform school staff or their family physician of their efforts to quit and should be able to obtain adult support. New quitters may become irritable for a few weeks and have difficulty concentrating; if adults both at home and at school could be reasonably tolerant during this period, these youth may try harder to maintain cessation. If, as the adolescent literature indicates, repeated quit attempts are associated with a greater likelihood of successful cessation among adolescents, cessation information should be provided repeatedly in school health education curricula, and physicians should routinely and repeatedly advise their adolescent patients to quit smoking.

Finally, counteraction of social influences still needs further work in the cessation context. For example, what happens to friendships among adolescent smokers when one of the friends quits? Can quitters maintain acceptance of tobacco-using friends? Or will this be difficult because smoking represents rebellion and quitting reflects a symbolic return to conventional society? These sociological questions need to be addressed to better understand how to increase adolescent smoking cessation [e.g., 62,63].

REFERENCES

22. McNeill AD, West RJ, Jarvis M, Jackson P, Bryant A. Cigarette


