Project EX
Outcomes of a teen smoking cessation program

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Abstract

Project EX is an eight-session teen school-based clinic tobacco use cessation program that involves the inclusion of enjoyable, motivating activities ("games," "talk show," and alternative medicine-type) to try to enhance quit rates among youth. This clinic program was tested in a three-group experimental design: clinic-only, clinic plus a school-as-community (SAC) component, and standard care control. Eighteen schools were assigned to the three conditions using a randomized block design. A total of 335 smokers participated in the study, making this the largest controlled teen smoking cessation field trial conducted to date. Seventeen percent of the smokers enrolled in the clinics had reports of having quit smoking for at least the last 30 days at 3-month follow-up (5 months after the program quit day), compared to only 8% of the control condition smokers over than same time period. The Project EX clinic component appears to be an effective means of tobacco use cessation among teens. © 2001 Elsevier Science Ltd. All rights reserved.

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Most adolescent tobacco users are likely to continue using tobacco into adulthood (Flay, 1993; Sussman, Dent, Severson, Burton, & Flay, 1998). They are at risk for physical consequences of tobacco use, and some of these consequences may begin their course in adolescence (Dwyer, Rieger-Ndakorerwa, Semmer, Fuchs, & Lippert, 1988). Despite large scale prevention efforts, the prevalence of adolescent smoking in the US decreased only 1% since 1981, and it had been increasing by approximately 1% per year from 1991 until 1998. This last year it has begun to level off. In 1999, 35% of high school seniors had smoked a cigarette in the last 30 days, and 23% of high school seniors were daily smokers (Johnston,
Adolescent tobacco use cessation efforts are needed to stop the habit before addiction and physical consequences accumulate (US Department of Health and Human Services [US DHHS], 1992).

Prior efforts at adolescent tobacco use cessation have been disappointing. In terms of unaided cessation, approximately 40% of adolescent smokers who have smoked in the last month report having tried to quit at some point in the past and failed (Institute of Medicine [IOM], 1994; Sussman, Dent, Severson, et al., 1998), the remaining 60% have not even tried. In terms of adolescent cessation programs designed to assist youth efforts, two recent reviews by Health Canada (1999) and Sussman, Lichtman, Ritt, and Pallonen (1999) found only a total of 26 published youth cessation studies. Only three of these studies used a controlled experimental design. Naturally occurring cessation over a 3- to 5-month period varied from 0% to 11% (a mean of 3%). The mean cessation program quit rate at equivalent follow-up was 11%. Only one study reported cell size n’s greater than 80. Thus, evidence for teen tobacco use cessation above 10% at follow-up is “slim.” Many teen cessation programs now being developed and marketed have not yet been well-evaluated.

There are at least three reasons that teens fail to quit using tobacco: social influences, chemical dependency, and lack of motivation. Learning skills such as how to avoid or cope with tobacco use situations have been thought to be among those most important for combating social influences that promote continued use or relapse in adolescents (Sussman, Dent, Burton, Stacy, & Flay, 1995). In addition, over half of adolescent smokers who try to quit report withdrawal symptoms (IOM, 1994; McNeill, West, Jarvis, Jackson, & Bryant, 1986; US DHHS, 1994). Certainly, providing information on how to cope with withdrawal symptoms, strategies of quitting that minimize withdrawal, such as tapering or nicotine substitutes, and skills for cessation maintenance such as coping with postcessation urges by “waiting it out” or exercise, are of importance to facilitate successful quit attempts (Sussman, Dent, Burton, et al., 1995). Further, there is a need to consider motivation for quitting (Nezami, Sussman, & Pentz, in press). When youth are prompted to consider “why” they should not continue to engage in tobacco use and made aware of the social reinforcers to quit rather than continue using tobacco, and this information is placed into a palatable form, youth attempting to quit may put greater effort into quitting. Motivations for change may best be placed in a framework of discrepancies between one’s current behavior and one’s life goals (Miller & Rollnick, 1991). We considered these three reasons for difficulties in quitting within this theoretical framework when designing our program.

The present study utilized continuation high school (CHS) youth as subjects. CHSs are an alternative public high school system in California. When reaching high school age, those students who are unable to remain in the traditional public high school system for functional reasons, including poor academic performance and behavior problems, are transferred to a CHS. There are approximately 500 CHSs in the State of California. CHS students are at relatively high risk for tobacco addiction and continuing their habit into adulthood. CHS students report much higher levels of cigarette smoking than traditional high school students; weekly smoking is approximately 47% vs. 15%, respectively (DeMoor et al., 1994; Sussman, Dent, Simon, et al., 1995), and greater than 80% of those who report smoking in the last 30 days smoke daily. Project EX is a state funded
research effort to develop and evaluate an effective tobacco use cessation program for these youth.

1. Method

1.1. Creation of the EX program

The starting point for Project EX program development was the cessation program from Project Towards No Tobacco Use (TNT; see Sussman, Dent, Burton, et al., 1995). That cessation project tested the efficacy of two tobacco use cessation clinic programs within a traditional high school setting, using a three-group experimental design. The two curricula were similar in format, but one focused on the chemical dependency aspects of tobacco use while the other focused on psychosocial dependence (perceived social influences) associated with tobacco use. A single five-session clinic was refined from the Project TNT cessation program. The development approach utilized in Project EX was to attempt to add enjoyable and motivating activities to the five-session TNT program in order to enhance quit rates, using an iterative development and evaluation process (Sussman, 1991; Sussman, Dent, Burton, et al., 1995). First, 19 focus groups were completed with a total of 233 subjects from six CHSs. The focus groups suggested that activities that emphasize the importance of quitting while one was young, alternatives to smoking, yoga, improvement in mood over time after quitting, looking at ex-smokers as strong people, and use of school events are particularly useful (Sussman, Lichtman, & Dent, 2001).

Ideas from the focus groups fed into a theme study in which hypothetical activities were presented to students in a written, paragraph form and rated for perceived efficacy. A total of 26 activities were compared. Nine motivational theory-driven activities were presented in both “game” (e.g., student competitions to solve puzzles) and “talk show” (e.g., like “Oprah”) teaching modality versions to determine students overall preference for either one of those modalities. In addition, eight alternative medicine-type activities (e.g., yoga) were also presented to determine student preferences for these novel, atheoretical activities. A total of 391 CHS students from four schools participated in that study, and each classroom rated one of two activity sets randomized in order. Talk show and game modalities were equally liked. The highest-rated activity was a talk show one that emphasized quitting while one is young. Other highly rated activities pertained to romantic choices when being tobacco-free and not being a victim of tobacco company advertisements. Instruction in yoga also was preferred (Dent, Lichtman, & Sussman, 2001).

The 14 top-rated activities in the theme study were further developed and tested in a “component study” in which complete activity lessons (clinic sessions) were conducted and individually assessed for immediate impact. Four of the activities were talk show modality and five were game modality. The five other retained activities were novel, alternative medicine-type. A total of 327 students from three CHSs were in the components study. Activity sets were randomly assigned across classrooms such that each student was
exposed to five activities over a 3-day sequence. The top eight ranked activities were retained and sequenced into a complete eight-session cessation clinic program (see Lichtman, Dent, Colwell, Smith, & Sussman, 2001).

1.2. Clinic content

The final clinic curriculum involves eight sessions delivered over a 6-week period. The first four sessions are held in a 2-week period. During that period, students are not asked or required to quit immediately, but rather are prepared to strengthen their attempt to quit between Sessions 4 and 6. The second four sessions that are held once per week during the following month and are focused on maintenance of their quit attempt. Session 1 imparts the ground rules for the clinic and discusses reasons for using and quitting tobacco. Also the talk show “family and friends confront smokers about their habit” is completed. The smoker talks about being nagged, whereas the family expresses their worries and how the smoker has become more irritable after becoming a smoker. Session 2 discusses how tobacco use can cause, rather than relieve stress. The talk show “your cigarettes may be stressing you out” is completed. “Guests” include an ex-smoker, psychologist, and a physician. Guests discuss how tobacco use actually increases, rather than decreases, stress. Youth learn healthy ways (skills) to cope with stress. Also, they practice the “healthy breathing” novel-type activity. They are instructed how smoking hurts one’s breathing, and are provided with exercises on healthy breathing.

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Session 3
discusses the harmful substances in tobacco and how it can injure one’s body. Youth also play the game “is smoking on the menu.” Students create a menu of possible categories and order questions regarding the dangers of passive smoke as a group competition. Session 4 discusses the first step of breaking an addiction by making a commitment to quit, and youth discuss means of quitting. Physical and psychological aspects of withdrawal are discussed. They also play the talk show “quitting smoking: I’ve been there and it does get better.” This talk show describes guests who are smokers at different stages of the quitting process.

Session 4
discusses more about nicotine and addiction and strategies of managing withdrawal symptoms. Psychological coping includes self-forgiveness and avoiding false expectations regarding how quitting will and will not affect one’s life. Session 6 involves learning maintenance strategies including avoiding weight gain, and practicing the “yoga activity” to maintain a sense of balance. This is a novel activity in which students learn several easy postures that they can use to feel more relaxed. Session 7 involves learning more maintenance strategies including assertiveness training and anger management. Participants also learn the “letting feelings pass” meditation activity. This is a novel activity, in which participants learn that sometimes just letting feelings pass can be more effective than reacting to them. They learn relaxation and breathing meditations. Finally, Session 8 involves learning means to avoid relapse, and mentions how topics covered in the tobacco cessation clinic could be applicable to other substances. Youth also participate in the talk show “warning: waiting to quit smoking may be hazardous to your peace of mind.” They learn that it’s better to quit and stay stopped when you are young, due to an accumulation of consequences with age.
1.3. School-as-community component

A “school-as-community” (SAC) component was modeled on Project Toward No Drug Abuse (TND; Sussman, Galaif, et al., 1997). The Associated Student Body (ASB), under teacher supervision, organized service, recreational, and job training functions and, through a project newsletter, permitted expression of antitobacco use attitudes at the school. We refer to this unique community component as SAC, because it involves an enhanced school environment and a limited movement outward to the larger community (Sussman, Craig, Simon, & Galaif, 1997; Sussman, Galaif, et al., 1997). This component was thought to facilitate school-based efforts in cessation of tobacco use by providing an alternative channel to promote conservative attitude shifts (involvement in antitobacco use/proquitting activism may encourage the quitting process), and subjective “ownership” of the cessation program ideals by the school (e.g., Pentz et al., 1989; Sussman, Craig, et al., 1997). This component represents a social climate/interpersonal source of motivation to facilitate tobacco users to quit. Several activities were designed to reach a large percentage of the student body (Sussman, Galaif, et al., 1997).

1.4. Recruitment of subjects and research design

We have had continuing involvement with over 20 school districts since 1986. This sample was appropriate for the present study because (1) control over drug education programming at these schools can be arranged and (2) the schools are representative of schools in five large southern California counties. Eighteen CHSs were assigned to the three conditions based on use of a randomized block design procedure, which involves calculation of factor scores derived from archival school demographic information, arranging schools along a single factor score continuum, and then randomly assigning adjacently scored schools to conditions (see Dent, Sussman, & Flay, 1994). The condition manipulation was whether or not the high school conducted the clinic alone or the clinic and the SAC versions of the program, or served as a standard care control.

Clinic recruitment included use of flyers, brief announcements by project staff in each classroom, word of mouth, and school staff referral. Student participation in cessation clinics was voluntary, and individuals wishing to participate were given credit and class release time. To be eligible for study participation, a student must have used tobacco in the last 30 days prior to the first session, and had to join the clinic in the first 2 of the 6 weeks (on or before Session 4).

1.5. Data collection and questionnaires

Measurements of clinic participants took place at baseline (pretest), immediately postprogram, and at a 3-month post program follow-up. At control schools, tobacco using students volunteered to take the baseline and 3-month follow-up surveys. Prior to conducting the clinics (or requesting survey participation in control schools), a school-wide tobacco use prevalence survey was conducted, to assess the number of tobacco using students at the school.

Paper-and-pencil questionnaires were administered by trained Institute Data Collection staff, generally at the students’ school during regular school hours. A few students who had
left the school at follow-up were tracked to their subsequent school location or parents’ home, where they were interviewed by telephone. Measures included tobacco use behavior and intentions (e.g., Graham et al., 1984; Stacy et al., 1990; Sussman, Dent, Simon, et al., 1995). Questions were directed to lifetime use and 30-day use of cigarettes, smokeless tobacco, and cigars. The use of these simple, appropriately time-anchored, rating scale items have been shown to have adequate psychometric properties (Stacy et al., 1990). In addition, nicotine dependence (using the modified Fagerstrom nicotine dependence scale [mFDQ]; Prokhorov, Pallonen, Fava, Ding, & Niaura, 1996), and stages of tobacco use development and cessation (Stern, Prochaska, Velicer, & Elder, 1987; Sussman, Dent, Burton, et al., 1995) were assessed. A score of six and above on the mFDQ indicates nicotine dependence (Prokhorov et al., 1996). Demographic measures included age, gender, and ethnicity. Process measures at immediate posttest were on a 1 (not at all)–10 (extremely)-point scales, and included adjective ratings of perceived clinic helpfulness, interest, likability, informativeness, well-organized, amount learned, enthusiasm of facilitator, and how well-informed the facilitator was (e.g., Brannon et al., 1989). Each of the eight sessions also were rated on the same scale. Reports of nonsmoking were verified by CO level in expired breath samples, using a cutoff of 9 ppm (Glasgow, Morray, & Lichtenstein, 1989).

2. Results

2.1. Recruitment and baseline comparability

Based on the school-wide tobacco prevalence survey, a total of 772 (54%) of the students at the 12 intervention target schools reported smoking cigarettes within the last 30 days, and the school level prevalence of smoking did not vary across the program conditions. A total of 259 (34%) of the target population enrolled in the clinics, 139 at the clinic-only schools, and 120 in the clinic plus SAC schools. All enrollees smoked cigarettes; 46% smoked only cigarettes, 36% smoked both cigarettes and cigars, 6% both smoked cigarettes and used smokeless tobacco, and 12% used all three tobacco products. Among the cigarette smokers, 85% smoked daily with an average of 8.8 cigarettes/day (S.D. = 9.3), based on a two-item index \( r = .83 \) composed of the number of cigarettes reported to be smoked on an average day and the number of cigarettes smoked yesterday. As scored on the Prokhorov et al. (1996) adaptation of the Fagerstrom Nicotine Dependence scale, 25% scored in a no-or-weak signs of addiction range (0–5), 58% scored in a moderate addiction range (6–13), and 17% scored in a heavy addiction range (14–21). A total of 64% of the sample were male; 47% were Latino, 27% were white, 8% were Asian, 6% were African American, and 12% were “other.” The mean age was 16.8 (S.D. = 0.8), with a range from 14 to 19 years of age. These demographics of the clinic enrollees did not differ significantly between program conditions.

Prior to the clinic, program facilitators visited each classroom at the school and provided a brief 5-min presentation regarding the availability of a tobacco use quit clinic over the next few weeks. The classroom teacher indicated that elective class credit and class release time would be offered for participation in the quit clinic. At pretest, clinic participants were asked
how they had heard about the clinic and the main reason they came to the clinic. A total of 45% of the participants indicated that classroom presentations by the facilitator alerted them to the availability of the clinic, while 41% said they were referred by a teacher (32%) or other school staff member (9%). A total of 12% said they heard about the clinic through a friend and only 2% said it was through a flyer. A total of 90% said they the main reason they came was to get help with quitting tobacco, while only 6% said it was to get class credit, and 4% said it was to get out of class.

A total of 76 of 202 (38%) smokers surveyed at baseline at the six control schools consented for follow-up. The demographics and tobacco use measures of the 76 targeted control students did not differ significantly from the program condition subjects values listed above (all $\chi^2$ and $t$ test values $P'$s > .05). Thus, 335 youths were included in this design (139 clinic-only, 120 clinic plus SAC, 76 controls), making this the largest controlled teen smoking cessation field trial conducted to date.

2.2. SAC manipulation

The SAC manipulation appeared to be implemented as designed. There were an average of 10.2 ASB meetings (range = 6.5 to 18.9) examined across the six SAC schools, over an average of 5 months (range = 3 to 7). An average of 15 youths attended each meeting (range = 6 to 25; 9% of each school was involved). Tobacco use hazards and tobacco use prevention were emphasized at the schools (i.e., discussed at over half of the meetings); however, tobacco use cessation was only emphasized at two of the schools. All six schools completed 6 events in an average of 5.2 of the 6 categories (range = 4 to 6) suggested by the Project TND staff. There were job training talks and competitions events at four schools and field trips at five schools, whereas all schools completed recreation, activism, and fund raising activities. There was an average of 60.2 youths at these events (range = 31.6 to 127.5; average of 35% of each school). The events discussed tobacco hazards, but only half the schools emphasized tobacco use prevention or cessation.

Similar to the findings of Sussman, Galaif, et al., 1997, project clinic facilitators and staff (principals or school counselors) reported that all 18 schools had offered some form of tobacco education in their regular health education class curricula and half of the clinic-only and control schools did participate in the Great American Smokeout (a 1-day event). In addition, there was a “smokeout” assembly held at two of the control schools. Finally, one control school held approximately five drug/tobacco prevention/cessation classes. No other tobacco-specific events were reported at these other non-SAC 12 schools.

One expected outcome for the SAC component was that it would facilitate recruitment rates to clinics at those schools, as the ASB activities were initiated well before and during the offering of the cessation clinics at those schools. However, the recruitment rate in the SAC condition (32%) did not differ significantly from the clinic-only condition (35%).

2.3. Clinic process and retention

Project facilitators read through, discussed, and role-played all clinic sessions before delivering them. They included one 25-year-old white male and five white females (25–54
years old), and their delivery of programming was counterbalanced across the program conditions. A total of 141 of the 259 smokers who enrolled completed the clinic for a retention rate of 54%. The retention rates were identical for the clinic-only and SAC conditions ($\chi^2(1) = 0.11, P > .05$) and clinic completion was not related to gender, age, ethnicity, addiction level or types of tobacco products used (all $\chi^2 P$'s > .05).

The eight student rated overall clinic process-related adjectives (e.g., helpful, interesting, liked) were highly associated with each other (coefficient $\alpha = .90$), and were averaged to compose an index. The average process index rating did not differ by program condition and was a very favorable 8.18 (S.D. = 1.56) overall mean. Also, all eight individual clinic sessions were rated highly, at least 6.93. The three alternative medicine-type sessions were rated the highest, with means ranging from 7.59 to 7.94 (S.D. = 2.25–2.66). The “Is smoking on the menu” game format session was next most highly rated (mean = 7.41, S.D. = 2.52) and the remaining the four sessions, all four with a talk show format, were least preferred among the sessions (their means ranged from 6.93 to 7.08; S.D. ranged from 2.55 to 2.61). The overall mean rating across the eight sessions was a favorable 7.39 (S.D. = 2.05). A least-significant difference ($P < .05$, paired $t$ test) between any two sessions is a value of .16, due largely to their high intercorrelation ($\alpha = .92$).

2.4. Immediate and 3-month outcomes

The end of clinic (immediate) posttest was administered to those completing the clinic-only. Those dropping out of the clinic and standard care controls subjects did not take the immediate posttest by design but were attempted follow-up at 3 months. In addition to assessing the clinic process items above, tobacco use and cessation stage were assessed as intermediate outcomes. The 30-day abstinence rate at immediate posttest was 14% and nearly identical across the two program conditions ($\chi^2(1) = 0.01, P < .05$). However, because the program did not have a firm single-day quit date, and fostered the recommendation that one should make continued attempts to reduce and eventually quit tobacco in the near future, an outcome measure such as 30-day tobacco use may not accurately reflect immediate program success. In response to the stages of cessation question “Did taking the Project EX class help you to do the following?,” which directly assesses present cessation stage as a result of program participation, 28% said that the class helped them quit tobacco use completely, 42% said it helped them reduce their tobacco use with the intention of quitting completely, 10% said it helped them reduce, but without the intention of quitting, 14% said they had not reduced, but the class helped them decide to quit in the near future, and 6% said it helped them to maintain a quit attempt they had started at the beginning of class. There were no differences in reported stages of quitting at immediate posttest between the clinic plus SAC condition and the clinic-only condition ($\chi^2(5) = 8.87, P > .05$).

The follow-up assessments occurred an average of 3.7 months (S.D. = 0.7 months) after the end of the clinic, or approximately 5 months after the clinic target “quit day” in Session 4. A total of 128 (49%) of the 259 clinic enrollees were contacted at follow-up, including 40 (42%) of the 118 clinic drop-outs (those who did not complete at least four of the eight clinic sessions). Also, of the 76 smokers targeted to be followed up from the
control schools, 44 (58%) were reached at follow-up, for a total follow-up rate of 51% among all those targeted. The follow-up rate did not vary significantly between the three conditions ($\chi^2(2) = 5.00, P > .05$). Furthermore, subjects measured at follow-up did not differ significantly from the full sample measured at pretest on any of the pretest variables (all $P$'s > .05); thus, there is no evidence that the follow-up sample is biased due to differential attrition.

The follow-up cessation rate results are shown in Table 1. Since follow-up tobacco use and quit rates did not differ across the two program conditions, data were combined. The “per protocol” analysis, in which cessation rates are calculated only among those completing the treatment (clinic) and measured at follow-up, yields a 30-day abstinence rate of 30% for clinic participants and 16% for controls, with an odds ratio of 2.21 ($P < .05$). A more conservative “intent to treat” analysis, which calculates rates including those subjects who dropped out of treatment as a means for controlling for potential bias due to subjects with a high risk of failure (i.e., relatively low cessation motivation) and self-selecting out of treatment, also yields a rate of 30% (and 16% for controls, odds ratio = 2.20, $P < .05$), providing further evidence that the study findings are robust despite the relatively high clinic drop-out rate.

Further assuming that all those not contacted at follow-up were still using tobacco, as a means to control for potential bias due to differential loss at follow-up, the 30-day quit rate is calculated at 19% across all clinic program enrollees. The quit rate among all the control school smokers using that same assumption is calculated at 10%, with an odds ratio = 2.37 ($P < .05$). The cessation rate among all clinic drop-outs is estimated at 11%, which is not significantly different from the rate in the control condition. This implies that full clinic participation was needed to improve quit rates.

A total of 62 self-reported quitters were administered CO readings at posttest or at follow-up as a means of validating self-reports of quitting. Differences in agreement between self-report and CO level was not found to differ by condition ($\chi^2(2) = 2.45, P > .05$). However, across conditions and times, there was an apparent overreporting of quitting; CO levels at or greater than 9 ppm, indicating recent smoking, were observed in 15% of the sample of self-reported quitters. Therefore, CO-adjusted quit rates were calculated by multiplying the cessation rate in each condition by .85. This adjustment,

Table 1
Project EX smoking cessation rate estimates (30-day abstinence at follow-up)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Clinic</th>
<th>Control</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per protocol</td>
<td>30% ($n=88$)</td>
<td>16% ($n=44$)</td>
<td>2.21</td>
</tr>
<tr>
<td>ITT</td>
<td>30% ($n=128$)</td>
<td>16% ($n=44$)</td>
<td>2.20</td>
</tr>
<tr>
<td>ITT + LTF</td>
<td>19% ($n=259$)</td>
<td>10% ($n=76$)</td>
<td>2.37</td>
</tr>
<tr>
<td>ITT + LTF + CO agreement</td>
<td>17% ($n=259$)</td>
<td>8% ($n=76$)</td>
<td>2.36</td>
</tr>
</tbody>
</table>

Per protocol = quit rate among those completing clinic and measured at follow-up; ITT (intent to treat) = quit rate among those assigned to treatment and measured at follow-up (includes drop-outs); LTF (lost to follow-up adjustment) = quit rate among all enrollees, assuming all not followed up were still using tobacco; CO agreement adjustment = quit rate adjusted by 85% for overreporting of quitting.
while lowering the absolute cessation rates, had little effect on either the relative difference or odds ratio.

Other analyses of the adjusted rates indicated that addition of the SAC component did not improve the cessation rates over the clinic alone (odds ratio = 0.48, \( P > .05 \)) and that the results did not vary as a function of gender, ethnicity, age, or type of tobacco use combination (all \( P \)'s > .05). However, using ITT + LTF quit rates as data, those scoring in the moderate and heavier addiction ranges (mFDQ of six or greater) were less likely to quit than those with lower addiction scores (\( \chi^2(2) = 16.02, P < .001 \)) in all conditions (see Table 2).

3. Discussion

Consistent with other tobacco use prevalence studies in continuation high school populations, we found a substantial number of tobacco users in our school-wide survey (Sussman, Dent, Severson, et al., 1998). Through a minimal effort recruitment campaign, we were able to enroll 34% of these tobacco users into the clinics, indicating that if formal in-school cessation clinics are offered to students, a substantial percentage will attend. The most effective strategies for recruitment were the direct methods of brief project staff presentations in class and school staff referral. Relatively indirect methods, such as posting flyers or and organizing antitobacco events (that did not address cessation directly) did not appear to increase subjects motivations to quit or willingness to participate in the clinics. Of those smokers surveyed prior to the offering the clinics, 52% reported that they would or might participate in a school-based clinic quit program, if it were offered. Thus, our maximum program reach could only be expected to include approximately half the smokers at a school. We obtained 65% of those who could be expected to enroll in the clinics. Perhaps more intensive direct recruitment methods, such as extended in-class presentations or other means of face-to-face contacts with potential enrollees, would increase the recruitment rates even further.

We found that, similar to other clinic cessation studies, only about half of the clinic enrollees completed the full course of treatment (Sussman et al., 1999). The only incentives we offered participants was class credit and class release time, and the vast majority of those completing the clinics indicated that these were relatively unimportant

<table>
<thead>
<tr>
<th>Addiction level (mFDQ score range)</th>
<th>Clinic</th>
<th>Control</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (0–5)</td>
<td>42% (n=63)</td>
<td>16% (n=24)</td>
<td>3.80</td>
</tr>
<tr>
<td>Moderate (6–13)</td>
<td>13% (n=147)</td>
<td>8% (n=34)</td>
<td>2.36</td>
</tr>
<tr>
<td>Heavy (14–21)</td>
<td>7% (n=49)</td>
<td>3% (n=18)</td>
<td>1.96</td>
</tr>
</tbody>
</table>

mFDQ is the modified Fagerstrom nicotine dependence scale (Prokhorov et al., 1996). Addiction level strongly predicts quitting (\( P < .001 \)) in both conditions, but the clinic to control odds ratios across addiction levels do not vary statistically, i.e., there is no treatment by level interaction (\( P > .05 \)).
reasons for attending the clinics. Perhaps more substantial incentives for complete participation, such as eligibility for a raffle upon clinic completion, an end of clinic field trip, or even monetary compensation for their time would improve the retention rates in the clinics. On the other hand, there is no guarantee that the students enticed to stay in the clinics would subsequently quit. If such means for retention were to be initiated, a carefully conducted study would need completion to discern whether those incentives alone, without any clinic program exposure, enhances quit rates, as they are potential confounders of the clinic content.

The reach and retention of subjects in this program may make one ponder whether other modalities might reach more youth. While not traditionally done, cessation programming could be conducted in the classroom as part of a regular health education curriculum. In this way, all the tobacco users at school would be exposed to programming and retention would not even be an issue. Few such studies have been completed, but now are being recommended (e.g., Health Canada, 1999).

Those that did complete the clinics seemed to enjoy sessions and found them to be useful. A relatively large number of them reported at the end of the clinic that the clinic directly helped them quit tobacco use. Perhaps this was due to the fact that the clinic content was developed in an iterative manner, with a series of student inputs and ratings on candidate activities. By gathering information from a large number of students prior to the activity development, having students “choose” those they enjoy and perceive as effective, it is not surprising that clinic participants rated the final clinic sessions highly.

While reach and retention and likability of a program are important aspects of any cessation program, a widely attended and liked program is only as good as its effectiveness. We found, under a variety of analytic assumptions, that the likelihood of quitting in this population was over twice as high among the clinic participants than nonparticipants. The absolute level of cessation at clinic schools varied between 17% and 30%, depending on how conservative a set of assumptions one wished to make, but the relative odds of quitting over nonclinic schools was essentially the same. We note that the relative odds of quitting with a program based on the review of 26 prior studies was about 4.0 (11% vs. 3%, on average). But most of those studies were small, did not have a control group, and did report results often under a liberal set of analytic assumptions (e.g., not controlling for drop-outs). Therefore, we believe that even our most conservative estimate of cessation rates (17%) represents an improvement of the state of art of teen cessation efforts.

Clearly, there is room for improvement in cessation rates. Not surprisingly, we observed that those students who scored low on the Nicotine Dependance Scale were the ones most like to quit, with or without the program. In terms of the absolute difference in rates, the clinic seemed to have the greatest impact on those not yet heavily addicted to nicotine. Although issues around coping with nicotine addiction and withdrawal were covered in the clinic sessions, perhaps the addition of a pharmacological adjunct such as nicotine patches or nicotine substitutes or inhibitors is needed to reach those teens who are scoring as highly dependent on nicotine. Such strategy has worked well for adults, where combined behavioral and pharmacological treatments produce the highest quit rates. Unfortunately, none of the proven pharmacological aids for cessation have been either evaluated widely among teens or approved by the FDA for their use. Future teen cessation studies should either attempt to
evaluate the safety and utility of pharmacological aids or strengthen the behavioral manage-
ment aspects of programs regarding nicotine addiction and withdrawal.

Finally, although the Project EX clinic program can be viewed as successful, there was
no apparent gain in efficacy with the addition of the SAC component. It was hypothe-
sized that the SAC component would both improve the reach and potentiate the clinic
through a social climate/interpersonal source of motivation manipulation. Although the
implementation of this component appeared to be carried out as planned, we found no
evidence for its utility. We therefore conclude that this type of component does not
enhance clinic effectiveness and should not be use as an adjunct to the Project EX
school-based teen cessation clinic, at least as implemented as in this study. It is certainly
possible that other forms of implementing this type of component, such as more control
over the content of events or other types of events could have the desired effect (e.g.,
cessation technique assemblies).

In summary, this is largest teen cessation trial to date, one of a handful to involve a true
experimental design, and that has revealed cessation results at follow-up that are among the
highest achieved with teens. These results indicate programming that is almost as effective as
that found for adults (see Sussman et al., 1999) can be created for youth if it is enjoyable,
provides sufficient rationale to quit across several sessions, and involves instruction in coping
strategies that appeal to youth (e.g., mediation and yoga). The current program is one that
works and should become available for dissemination.

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