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Web-based support as an adjunct to group-based smoking cessation for adolescents

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Abstract

Although group-based programs remain the most common treatment approach for adolescent smoking cessation, success rates for these programs have been relatively modest, and their reach may be limited. Web-based adjuncts may be one way to boost the efficacy and reach of group-based approaches. The purpose of this study was to evaluate the effectiveness of enhancing the American Lung Association's Not on Tobacco program (NOT) with a Web-based adjunct (NOT Plus). Twenty-nine high schools were randomly assigned to either the NOT program alone or to the NOT Plus condition, which included access to a specially designed Web site for teens, along with proactive phone calls from the group facilitator to the participant. Self-reported smoking behavior was obtained at end-of-program and at a 3-month follow-up. Using hierarchical linear modeling, accounting for the clustering of students in schools, and controlling for student gender, grade, race, and baseline smoking rate, there was a marginally significant ($p = .06$) condition effect at end-of-treatment and a significant effect at 3-month follow-up ($p < .05$) favoring the NOT Plus condition. Approximately 57% of adolescents reported visiting the Web site, and among the NOT Plus condition, use of the Web site was associated with cessation significantly at end-of-program ($p < .05$), but not at 3 months. Adolescents in urban schools were more likely to access the Web site than those in rural schools. Participants who visited the Web site rated it positively on several dimensions. Reasons for not using the Web site will be discussed, as well as its value as an adjunct.

Introduction

Although research on youth smoking cessation continues to grow, substantial progress still needs to be made to reach the goals outlined by the Youth Tobacco Cessation Collaborative in their National Blueprint (YTCC, 2000). Chief among these goals is "giving every teen smoker access to effective tools, services, and supports to help them quit by 2010." Currently, the most predominant forms of youth cessation programming are group-based approaches located in schools (Curry et al., in press). Although some of these programs have had promise (Sussman, 2002), they also have limitations, which may hinder our ability to reach the goals of the YTCC. These limitations include quit rates that do not yet approach those for adults (Mermelstein, 2003), difficulties with recruitment and hence limited reach, and lack of follow-up support, which is often critical for long-term success (Fiore et al., 2000). The purpose of this paper is to report the results of a trial designed to address two of these potential limitations: Improving quit rates and enhancing support beyond the end of the group program. Specifically, we report the results of adding a Web-based adjunct to the American Lung Association's Not on Tobacco (NOT) program for youth.

The American Lung Association's (ALA) NOT program (Dino et al., 2001; Horn, Dino, Fernandes, & Kalsekar, 2004) embodies many of the characteristics of "better practices" for

youth smoking cessation (McDonald, Colwell, Backinger, Husten, & Maule, 2003). The NOT program is based on cognitive behavioral principles of behavior change, emphasizes experiential learning through role playing and homework assignments, addresses risk factors relevant for youth who smoke, and fosters peer support among group members. A recent comprehensive review of end-of-program quit rates from six controlled trials and 10 field-based evaluations of the NOT program (including more than 6,000 youth from five states) found an aggregate quit rate of 15% in the controlled trials and 26% in the field evaluations (Horn, Dino, Kalsekar, & Mody, 2005). These rates were based on an intent-to-treat analysis. Youth in the NOT programs were almost two times more likely to quit than comparison youth. Although, as the authors noted, they included in their review only studies for which they had some oversight, they indicated that the quit rates they report were consistent with rates found by Sussman, Lichtman, Ritt, and Pallonen (1999), and also, with rates reported by other ALA evaluations not linked to theirs.

The results of the NOT evaluations on end-of-program quit rates are certainly positive, but as with all group-based programs, there is concern about both enhancing initial quit rates and maintaining treatment gains beyond the end of treatment. Adjuncts that move beyond the treatment setting may be one way to improve both cessation and maintenance. Two possible adjuncts are proactive telephone calls and Internet-based support. A substantial literature documents the benefits of proactive telephone support for adult smokers compared with controls (Lichtenstein, Glasgow, Lando, Ossip-Klein, & Boles, 1996; Stead & Lancaster, 2002), but the benefits of adding proactive telephone calls vs. face-to-face treatment are less certain (Stead & Lancaster, 2002). For adolescent smokers, little research exists to date about the benefits of adding proactive telephone calls to existing treatments. In one of the very few, if only, controlled evaluations to date, Lipkus and colleagues evaluated the efficacy of adding proactive telephone counseling to self-help materials for adolescents and found no improvements in quit rates as a result of adding the phone counseling (Lipkus et al., 2004). It is not yet known whether proactive phone calls will enhance the success of face-to-face treatments for adolescent smokers.

Internet-based adjuncts may be another option for helping to enhance initial quitting and extend or maintain the gains of treatment programs for adolescent smokers. Adolescents and young adults tend to be particularly technologically savvy; as of 2003, 80% of high school students reported using the Internet (DeBell, 2005). In general, Internet adjuncts offer the promise of 24/7 availability, which can be a welcome supplement to once-weekly group sessions. In addition, the Internet offers relative anonymity, which may be a benefit to youth who are concerned about parents or others finding out about the adolescent's smoking.

Few Internet-based cessation interventions, however, have systematically evaluated outcomes (e.g., Cobb, Graham, Bock, Papandonatos, & Abrams, 2005; Etter, 2005), with even less known about outcomes among adolescents. Cobb et al.'s initial evaluation of a Web-based smoking cessation program suggests, though, that the social support aspects of the program may be an important factor in quitting. Promising pilot outcomes have been demonstrated with a "virtual world chat room" for adolescent smoking cessation, with 39% of adolescent participants labeling themselves as "former smokers" at 1-month follow-up (Woodruff, Edwards, Conway, & Elliott, 2001).

Building upon the potential for using a widely disseminable adjunct, such as the Internet, to enhance the outcomes of a face-to-face, relatively well-established group program (the NOT Program), the current paper reports on a process and outcome evaluation of adding a Web-based adjunct to the NOT program. A randomized, two-group design compared adolescents receiving an adjunct enhanced program (NOT Plus) with those receiving the NOT program alone. It was hypothesized that NOT Plus would be more effective than the NOT program

alone in achieving abstinence at the end-of-treatment and at follow-up. We examine smoking outcomes from the two treatment conditions, as well as examining usage patterns and acceptability of the Web-based adjunct.

Methods

Overview of design and treatment conditions

The study was a randomized, two-arm trial, with schools randomly assigned to condition: (a) the standard NOT program, a 10-session group-based program; or (b) a NOT Plus condition, which included three adjuncts. The first adjunct involved proactive, facilitator-initiated telephone calls to the students, with one call during quit week (week 5), and up to four booster calls between the end-of-treatment and 3-month follow-up. The primary purpose of the call during the quit week was to encourage the participant to try to quit and to come to the group session that week. The goals of the phone calls after treatment were to continue to provide support and encouragement for either staying quit or continuing to try to quit, and to review gains and strategies as needed. The calls were brief, often lasting only a few minutes.

The second adjunct was access to the Not Hooked Web site, developed specifically for adolescents trying to stop smoking. The Web site contained facts about smoking and health; motivational messages from teens who had quit; strategies and tips for not smoking; and access to incentive gear. At the time of the evaluation, this site was newly developed, with access restricted to study participants in the NOT Plus condition. The third adjunct was access to the American Lung Association quitline; however, utilization of the quitline was very low (only five students called), so the two primary adjuncts tested in the NOT Plus condition were calls and Web access. Assessments were conducted at baseline, at the end of the group program, and at 3 months after the end of the group program (approximately 6 months after baseline).

School recruitment and characteristics—Twenty-nine schools participated in the evaluation. Participating schools were selected from an initial pool of 52 high schools throughout Illinois that had expressed interest to the American Lung Association (ALA) of Illinois in hosting the NOT program. To be eligible for inclusion in the study, schools needed to be regular public or private high schools (two small alternative schools for pregnant teens were excluded because of the unique cessation and relapse issues surrounding pregnancy) and willing to assist in the recruitment of students (e.g., post flyers in the school). All schools in the Springfield/downstate region that applied and that met initial criteria were included in the study ($n = 11$). Schools in the Chicago area ($n = 18$) were selected on a first come, first served basis. Efforts were made to match schools based on geographic location, urbanicity, ethnic diversity, and school size, with blocked randomization to the NOT or NOT Plus condition. Schools were paid \$500 for their participation and assistance in scheduling the program. School size ranged from 110 to 2,514 students, with a median of 1,356. Racial distribution of the students in the schools ranged from 99.7% White to 99.9% Black, although neither total school enrollment nor percent of White students differed significantly by condition.

Participants—Students were recruited through a combination of flyers, school announcements, assemblies, and/or personal referrals from teachers or coaches. All students participated voluntarily; no schools mandated enrollment in the program. For participation in the evaluation of the program (e.g., completion of questionnaires), student assent was required. However, a waiver of written parental consent was granted by the University of Illinois at Chicago Institutional Review Board. The granting of the waiver was based in part on the fact that parental consent was not required for student participation in the cessation program, since the program was being offered by the ALA of Illinois, and conducted separately from the research evaluation being done by the University of Illinois Chicago researchers.

Across all the schools, 351 adolescent smokers (53.8% female) participated in the evaluation ($n = 170$ in the NOT condition, $n = 181$ in the Not Plus condition). Their ages ranged from 14 to 19 years ($M = 16.4$, $SD = 1.1$). Students were in grades 9–12, with 11.1% in 9th grade, 29.1% in 10th grade, 28.2% in 11th grade, and 31.3% in 12th grade. Most reported their race as White (74.4%), with 13.4% Black, 5.1% Latina/Latino, and 6.8% other or bi- or multi-racial. For subsequent analyses, race was coded as White vs. non-White.

Group facilitators—Group facilitators, who were recruited and trained by the ALA of Illinois, included 15 women and 1 man. Facilitators were employees either of the local ALA chapters in Illinois or of local health departments; they did not have any affiliations with the host schools. Only one facilitator had prior experience teaching the NOT program. Facilitators were assigned to schools in close geographic proximity to their area. Attempts were made to match the ethnicity of facilitators to the ethnic makeup of host schools. The facilitators at all schools with a majority of Black students (>70%) were also Black. Because facilitators were assigned to schools within their geographic region, facilitators could not be balanced across condition. Thus, only four of the 15 facilitators conducted groups in both conditions. These four facilitators were all in the greater Chicago metropolitan area; among them, they led 16 of the 29 groups.

Procedures

Baseline data were gathered by survey during the first group session. Surveys were collected by group facilitators and immediately mailed to the research team at UIC. The end-of-program survey was distributed by group facilitators to participants at the final session, along with prepaid envelopes to be returned directly to the researchers. For students who did not attend the final group session, surveys were either delivered directly to the students by school personnel or mailed directly to the students, with repeated mailings for students who failed to respond. Three months after the end of program, surveys were mailed directly to participants with prepaid envelopes provided. Participants were paid a cash incentive for completing surveys (\$10 or \$15).

Measures

Demographics—Demographic variables assessed included age, gender, grade, and race/ethnicity. *Smoking rate* was assessed with a 7-day smoking calendar, from which we computed average number of cigarettes smoked daily. In addition, past 30 days smoking (number of days and number of cigarettes smoked per day) was assessed at each wave as well. Expired air carbon monoxide measures were taken for all participants who attended the last group session, with values of 10 ppm or less used to confirm self-reports of no smoking. Abstinence at the end of the program and follow-up was defined as self-reports of no smoking at all in the past 7 days; those who had smoked even a puff were considered smokers. *Motivation to quit* was assessed with one item asking how motivated the respondent was to quit smoking, using a scale from 1 = *not at all* to 10 = *extremely*.

Web variables—There were two sources of information regarding adolescents' use of the "Not Hooked" Web site: (a) Tracking data from the Web site, and (b) self-report data from the end-of-treatment survey. Access to the Web site required students to log in, which allowed us to track unique usage data and link Web data to survey data.

Web usage items were asked at end-of-treatment and included the following dimensions: How often students used the Internet; whether they visited the Not Hooked Web site. Those who did not visit were asked about reasons for not visiting. Those who did visit were asked to rate the site on several dimensions, using a 5-point Likert-type rating scale.

Results

Baseline characteristics

Table 1 presents the baseline demographic and smoking characteristics of the participants by condition. Overall, the sample was composed of youth who were regular smokers, smoking almost every day of the prior seven, and smoking on average between 7 and 11 cigarettes a day. The vast majority had tried to quit before, and close to half had at least one parent who smoked. At baseline, the two conditions differed significantly by smoking rate, with participants in the NOT condition smoking more than those in the NOT Plus condition. Thus, baseline smoking rate was entered as a covariate in analyses predicting outcome.

Program participation and study retention—Attendance rates did not differ for the group sessions by condition. Attendance was good, with participants averaging 7.4 ($SD = 2.5$) sessions of 10, and 4.1 ($SD = 1.9$) of the 6 sessions from quit week (week 5) until the last session.

Among the 351 students enrolled in the evaluation, surveys were returned by 64.1% at end-of-program and 66.1% at follow-up; attrition did not differ by condition. Students who failed to return surveys at end-of-treatment did not differ significantly on baseline age, race/ethnicity, smoking rate, or motivation; however, females were significantly more likely to return end-of-treatment surveys than males (74.1% vs. 52.5%, $\chi^2 [1,351] = 17.7, p < .05$). To account for any possible attrition bias, we used an intention-to-treat approach, making the assumption that non-responders were continuing smokers. Results were unchanged (in pattern, magnitude, and statistical significance) compared with analyses that did not make this assumption and used only known responders.

Overall program outcomes—At end-of-treatment, 30 students reported not smoking at all in the past 7 days, for an overall quit rate of 8.5% of the total baseline sample of 351, 4.7% ($n = 8$) for the NOT condition, and 12.2% ($n = 22$) for the NOT Plus condition. Carbon monoxide assessments, available for 25 of these 30 participants, confirmed self-reports for all 25. At the 3-month follow-up, 55 students met the 7-day criteria for not smoking (15.7% of the 351; 10.6% [$n = 18$] of NOT; 20.4% [$n = 37$] of NOT Plus). Among the 30 students who remained abstinent at end-of-treatment, 20 remained so at follow-up, 7 relapsed, and 3 did not respond. By follow-up, there were 25 new quitters who had not been abstinent at end-of-treatment. Using a 30-day no-smoking criterion at the 3-month follow-up, the percent abstinent dropped to 10.5% ($n = 37$ abstinent); 7.1% ($n = 12$) of NOT and 13.8% ($n = 25$) of NOT Plus.

A mixed-model logistic regression approach was used, via the NLMIX command in SAS, to examine 7-day abstinence at the end-of-treatment and at the 3-month follow-up. These models account for clustering students within schools. In addition, we included several covariates in each of the models (gender, age, race/ethnicity, baseline smoking rate). At the end-of-treatment, there was a marginally significant effect for the NOT Plus condition (Estimate = .8846, $t = 1.93, p = .06$; $OR = 2.42$), such that students in the NOT Plus condition were more than twice as likely to be abstinent than were students in the NOT condition. There was also a significant effect for baseline smoking rate (Estimate = $-.1064, t = 20.36, p < .0001$), whereby heavier smokers were less likely to quit; for gender (Estimate = .8100, $t = 2.09, p < .05$), whereby females were significantly more likely to quit than males; and for age (Estimate = $-.09, t = 4.85, p < .0001$), with quitters being younger than nonquitters. Results were similar at the 3-month follow-up, now with a significant effect for the NOT Plus condition (Estimate = .9038, $t = 2.36, p < .05$). In addition, baseline smoking rate (Estimate = $-.08587, t = 30.37, p < .0001$), gender (Estimate = .01966, $t = 2.91, p < .01$), age (Estimate = .0006, $t = 6.36, p < .0001$), and race (Estimate = .5076, $t = 2.25, p < .05$) all had significant effects in the equation,

with lighter smokers, younger, female, and non-White participants each more likely to be abstinent at 3 months.

Although there was no significant difference between conditions in the numbers of sessions attended by participants, prior research (Sussman, 2002) has shown that program participation predicts quitting. Thus, we also considered number of sessions attended in the equations predicting quitting. Attendance was a significant predictor of quitting at both end-of-treatment (Estimate = .2828, $t = 7.96$, $p < .0001$) and 3-month follow-up (Estimate = .1315, $t = 12.69$, $p < .0001$), with quitters attending significantly more treatment sessions than nonquitters. Participants who were abstinent at the end of treatment attended an average of 7.96 ($SD = 1.94$) sessions compared with 7.32 ($SD = 2.52$) for nonquitters, and participants who were abstinent at 3 months had attended an average of 8.33 ($SD = 1.65$) treatment sessions, compared with 7.34 ($SD = 2.50$) for nonquitters.

Use of the Not Hooked Web site—Among the 181 students assigned to the NOT Plus condition, 116 returned surveys at end-of-treatment. Among these students, 66 (56.9% of those responding; 36.5% of those assigned to condition) reported that they had accessed the Not Hooked Web site. Web data, using a password-based tracking system, confirmed that 29 of the 66 students had visited the Web site. However, due to logistical issues, the Web password-based tracking system was not operational immediately at the beginning of the intervention; thus, students may have visited early and not been tracked as visiting. The available Web data also did not provide details on date of visit, and thus we are unable to ascertain when students visited relative to their participation in the group cessation program; however, we do know that all visits occurred prior to 3-month follow-up.

Among the 29 students with confirmed Web site visits, most visited only once ($n = 22$). Total viewing time across all visits per student averaged 33.0 min ($SD = 32.3$ min, $Mdn = 22.0$ min, $Range = 2$ to 140). Total number of pages visited averaged 14.5 ($SD = 12.8$, $Mdn = 14.0$, $Range = 1$ to 56).

Web usage, receipt of proactive calls, and cessation outcomes—Among the 181 students in the NOT Plus condition, those who made any confirmed ($n = 29$) visits to the Web site were significantly more likely to be abstinent at end-of-treatment (22.7% quit versus 6.1%; $OR = 2.91$, 95% $CI = 1.07$ –7.93), but not at the 3-month follow-up (27.3% quit among Web visitors versus 16.5%). Because the other adjunct offered in the NOT Plus condition was telephone calls, we simultaneously examined the effect of telephone calls among the NOT Plus students. Calls were made during quit week (week 5) of the cessation program. In addition, up to four booster calls were made between the end of the program and the three-month follow-up. Only 57 students (31.5%) received the planned telephone call during quit week (week 5), and 145 (80.1%) received one or more booster calls between the end-of-treatment and 3-month follow-up.

In a regression analysis including both Web usage and call status, receipt of a quit-week telephone call did not significantly predict abstinence at the end-of-treatment, but use of the Web site did significantly predict cessation ($OR = 2.81$, 95% $CI = 1.02$ –7.71). Neither Web site usage nor receipt of any booster calls after end-of-treatment significantly predicted smoking status at 3-month follow-up.

Among the 66 students who self-reported using the Web site, ratings of the Web site were generally favorable. On a 5-point scale, where 5 = *extremely*, students liked the site fairly well ($M = 3.4$, $SD = 1.0$), rated the site as moderately easy to find ($M = 3.3$, $SD = 1.3$), moderately easy to use ($M = 3.4$, $SD = 1.2$), and moderately useful ($M = 3.3$, $SD = 1.2$). Self-reported visits to the Web site did not differ by gender or race; however, Web-tracked visits were more

common among girls ($n = 21$) than boys ($[n = 8]$, $\chi^2 [1, 181] = 4.12, p < .05$), but did not differ by race.

Students who reported that they did not use the Not Hooked Web site ($n = 49$) gave the following reasons for not visiting: Forgot about the Web site ($n = 28, 57.1\%$); no computer ($n = 9, 18.4\%$), no Internet access ($n = 7, 14.3\%$), and did not know about the site ($n = 5; 10.2\%$).

General access to the Internet—At end-of-treatment, participants in both conditions were asked about their access to the Internet (total $n = 225$); 19.7% said that they accessed the Internet less than once a month, 16.1% accessed it a few times a month, 35.4% accessed it a few times a week, and 28.7% accessed it daily. Frequency of using the Internet was compared among students attending urban, suburban, and rural schools; it was significantly higher among students in urban versus rural schools ($F[2, 220] = 3.61, p < .05$). Frequency of Internet access was directly associated with having access at home versus a location outside the home; students who accessed the Internet daily were more likely to report that they accessed it at home (68.8%), compared with students who accessed the Internet less than monthly, who were less likely to have access at home (35.7%), linear association ($[1, 223] = 13.94, p < .01$).

Discussion

This study evaluated whether adding a combination of proactive telephone calls and access to a Web site enhanced the effectiveness of a group-based smoking cessation intervention for adolescents, the ALA NOT program. After controlling for differences in baseline smoking rate, an intent-to-treat analysis indicated that abstinence rates for the NOT Plus condition were better than those for the NOT-only condition both at the end of treatment and at the 3-month follow-up. In addition, a process-to-outcome analysis suggested that Web site usage was related to initial quit status at the end of treatment, but not at the 3-month follow-up. Receipt of phone calls was not, however, related to abstinence. Thus, although the NOT Plus condition had better overall quit rates than the NOT condition alone, there was no evidence for the additional benefits of the phone calls.

The superiority of the NOT Plus condition appears to be related to an initial boost in quit rates from the use of the Web site, rather than from an improved post-group maintenance rate (or decrease in relapse rates). Relapse rates between the end of the group program and the 3-month follow-up did not differ by condition, and Web site usage was not associated with 3-month abstinence. Web site usage was also not significantly associated with post-program quitting. Thus, although abstinence rates jumped between the end of the group program and the 3-month follow-up, this increase in quitting could not be attributed to either Web site usage or to receipt of phone calls. Post-program quitting may be the result of a variety of factors for these adolescents, ranging from increased motivation for cessation to changes in life circumstances (e.g., high school graduation, jobs, seasonal changes). However, because we did not include a no treatment control group, we could not assess whether the post-program quit rates were indeed a “delayed” effect of program participation or a result of other factors. The lack of a no treatment control group also leaves open the possibility that the NOT program alone was not significantly better than no treatment. However, there is a growing accumulation of evidence supporting the benefits of cognitive-behavioral group programs, such as the NOT program, over no treatment (Sussman, 2002; Sussman, Sun, & Dent, 2006).

Our finding that the proactive phone calls did not enhance either initial quit rates or abstinence during the follow-up is important given Lipkus et al.’s (2004) similar finding that proactive counseling calls, when paired with self-help materials, did not improve cessation rates for adolescents. Both the current study and that of Lipkus et al. used phone calls as adjuncts to a

primary cessation program, either in-person or self-help. Thus, it may well be that proactive calls do not provide a significant improvement in abstinence rates above and beyond a primary program (cf., Stead and Lancaster, 2002). Alternatively, it may also be the case that the proactive calls were not an effective vehicle for this adolescent audience. Lipkus et al. noted difficulties in reaching adolescents at home, because of the adolescents' busy schedules. Our phone counselors similarly noted this problem, and reported frequently resorting to calling adolescents in the very early mornings, before school, when the adolescents were home, but not eager to engage in a call that lasted more than a brief, few minutes. Also, calling adolescents at home was often problematic, depending on privacy issues in the home for the adolescent. Thus, the "dose" of the calls, either in number or length, may not have been sufficient to result in any enhancement in abstinence rates. Given the increasing ubiquitous nature of cell phones among adolescents, however, it may be that using adolescents' cell phones as the delivery vehicle is a more effective route, overcoming some of the availability and privacy issues. Text messaging on cell phones may also be a possible way to deliver intervention messages to adolescents, with some encouraging preliminary results reported by Rodgers and colleagues (2005).

In contrast to the lack of support for the utility of the phone calls, the Web site findings were more encouraging. Despite some methodological glitches in tracking Web site usage online, the results suggest that Web site visits were associated with enhanced quit rates. Better tracking of Web site usage is clearly needed, though, to gain a more complete understanding of the mechanisms through which Web site usage increases quitting. Our data, though, also give a note of caution about the effectiveness of a Web site adjunct. Internet access was still limited for a good portion of our participants, notably those in more rural areas. Sun and colleagues (2005) have also recently found that 40% of a sample of 7th-graders in Southern California had home access to the Internet, although 90% had access at school. Privacy and extended time usage for visiting cessation Web sites may still be problematic at schools. However, as with cell phone usage, Internet usage and availability in homes continues to increase dramatically among adolescents and remains a viable vehicle for interventions. The bigger hurdle is likely to be prompting adolescents to visit the Web site. Thus, future interventions may consider either cell phone text-messaging prompts (cf., Rodgers et al., 2005) or email prompts as well. In addition, concerns about the limited health literacy of adolescents may need to be addressed before the full potential of health interventions on the Internet can be realized (Gray, Klein, Noyce, Sesselberg, & Cantrill, 2005).

Of note was the extremely low rate of use of the telephone quit line (5 users, or 2.8% of the NOT Plus participants). Because of these limited numbers, we did not further examine the link between quit line usage and cessation. Unlike the proactive, counselor-initiated phone calls, the quit line required a smoker to self-initiate a call. Thus, calling the quit line required both strong motivation as well as planning on the part of the adolescent in scheduling the call. At the time of this evaluation, the quit line hours were limited mostly to workday hours, which were unlikely to fit the schedules of adolescents in school. There is still little evidence about adolescents' use of quit lines, although their effectiveness with adults certainly argues well for more examination of their utility with adolescents.

The overall abstinence rates for both conditions in this evaluation (8.5% for intent to treat, at the end of treatment) were somewhat lower than those reported in other NOT evaluations (approximately 15%; Horn et al., 2005). If one considers the data only from participants who completed questionnaires at the end of treatment, then the overall quit rate at the end of treatment is 13.3%, still somewhat lower than the abstinence rate of 19% for "compliant" participants in the Horn et al. review. The current evaluation may appropriately be considered an effectiveness trial, given that the recruitment and intervention delivery took place under "real world" conditions, without the oversight or supervision of the research team, and using

local, group facilitators who were trained through an established process with the ALA of Illinois. The intervention was also delivered in mixed sex groups, rather than in sex-segregated groups, as has often been done in prior evaluations. Of note, though, is our finding that after controlling for several baseline characteristics (baseline rate, age, and ethnicity), females were more likely to quit than males, regardless of condition.

The conclusions from this evaluation are tempered by several methodological limitations. The overall completion rate was approximately 65% for the two post-treatment data collection waves, despite multiple attempts to reach the adolescents. Our data collection methods were restricted to paper and pencil questionnaires, with mail-in returns, thus limiting our ability to access youth in a variety of ways. Completion rates did not differ, though, either by condition, or by factors known to be associated with cessation (e.g., baseline smoking rate or motivation). In addition, biochemical verification was available only at the end of treatment, and only for those participants who attended the last group session. Although it was encouraging to find that all reports of abstinence were confirmed by carbon monoxide measures, one must also remember the limited half-life of carbon monoxide assessments and its limited utility in detecting sporadic smoking.

In sum, this trial found encouraging support for the benefits of adding a Web-based adjunct to a face-to-face group smoking cessation program for adolescents. Strengths of the trial included the heterogeneity of the adolescent sample, and the use of diverse school environments for hosting the group-based cessation program. Future research should consider ways to prompt or increase use of Web-based adjuncts.

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Table 1
Baseline demographic and smoking characteristics by condition.

	NOT, <i>n</i> = 170, <i>M</i> (<i>SD</i>)	NOT Plus, <i>n</i> = 181, <i>M</i> (<i>SD</i>)	τ/χ^2
Age	16.6 (1.14)	16.3 (1.04)	2.77**
Female (%)	52.4	55.2	0.59
Race/ethnicity (%)			16.13**
White	82.4	67.2	
Latino	5.9	4.4	
Black	6.5	20.0	
Other	5.3	8.3	
Mother smokes (%)	56.5	49.7	0.22
Father smokes (%)	46.7	46.5	0.98
Any previous quit attempts (%)	83.9	79.6	0.29
Average number of days smoking in past 7 days	6.5 (1.1)	6.2 (1.2)	2.42*
Average number of cigarettes smoked per day in past 7 days	9.2 (7.9)	7.3 (6.9)	2.38*
Average number of cigarettes smoked per day in past 30 days	11.9 (7.6)	8.9 (6.8)	4.00***

$p < .05$,

**
 $p < .01$,

 $p < .001$.