

The Long-Term Prevention of Tobacco Use among Junior High School Students: Classroom and Telephone Interventions

ABSTRACT

Objectives. The purpose of this study was to implement and evaluate the effectiveness of a long-term tobacco use prevention program for junior high school students that used college undergraduate change agents and telephone boosters.

Methods. A psychosocial intervention combining refusal skills training, contingency management, and other tobacco use prevention methodologies such as telephone and mail boosters was implemented in 11 junior high schools in San Diego County, California. Eleven other junior high schools served as controls. Of the 2668 participants, 57% were White/non-Hispanic, 24% were Hispanic, and 19% were of other racial/ethnic groups. College undergraduates served as change agents for both the classroom and booster interventions, the latter of which was delivered in the third (ninth-grade) year of the program.

Results. At the end of the third year, the prevalence of tobacco use within the past month was 14.2% among the intervention students and 22.5% among the controls, yielding an odds ratio of 0.71 for analysis at the school level.

Conclusions. Both college undergraduate change agents and direct one-to-one telephone interventions appear to provide cost-effective tobacco-related behavior modification. (*Am J Public Health.* 1993;83:1239-1244)

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Introduction

In the effort to prevent tobacco use among adolescents, numerous school-based tobacco use prevention programs have been implemented and evaluated. Although most have been effective in delaying the initiation of cigarette or smokeless tobacco use, these programs have not always reached minority and high-risk adolescents.¹ In addition, long-term results from such programs cannot always be ascertained.^{1,2}

In numerous studies, prevention programs that focus on the social influences model have successfully reduced the rate of initiation of smoking. However, recent reports of 6-year follow-ups have indicated that the effectiveness of these smoking prevention programs is not maintained.² An intervention by Flay and colleagues² included sessions during the sixth grade and minimal boosters in seventh and eighth grades. While the intervention was successful in preventing the onset of experimental smoking in students up to the eighth grade, the program neither decreased smoking levels nor increased the probability of remaining a nonsmoker in students beyond the eighth grade.² Murray and colleagues³ found that the intervention effects present at the 1-year follow-up of a seventh grade cohort were no longer apparent at the 2- and 3-year follow-ups.³⁻⁶

The most promising approaches to the prevention of tobacco use among adolescents are those that not only emphasize the social influences model but also focus on social skills training, media influences, and norm perceptions.¹ Junior high and high school tobacco use prevention

programs have been conducted by health educators, teachers, and same-age or older peer leaders. Another group that has been recruited to carry out these programs is undergraduate college students.⁷ Although the relative superiority of one type of change agent over another has not been conclusively demonstrated,⁸ using college-age students as facilitators has some distinct advantages. For one thing, they provide a cost-effective means of delivering the intervention; their efforts can be repaid with units of college credit rather than money, and thus these students may be more motivated than junior high or high school peer leaders to facilitate the intervention.⁹ For another thing, it has been hypothesized that undergraduate students would be better able than adults to develop a rapport with junior high students.^{8,10} Thus, methods for recruiting undergraduate facilitators as well as for increasing their effectiveness have been developed.^{8,11}

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Telephone calls have often been used to provide interpersonal support for behavioral change, but their use to induce change is relatively untested. A study at the Pawtucket Heart Health Program¹² developed an innovative approach both to promote program components and to provide counseling and support by telephone to individuals working to reduce their risk of heart disease. Results showed this procedure to be cost-effective in achieving behavioral change.

The present study evaluates the effectiveness of a tobacco use prevention project for junior high school students over a 3-year period. SHOUT (Students Helping Others Understand Tobacco) was delivered by college undergraduate change agents over a 3-year period. Following 2 years of classroom refusal skills and related anti-tobacco training, subjects received newsletters and personalized booster phone calls during their ninth-grade year.

Methods

Subjects

An initial sample of 22 schools with 3655 participants was identified in fall 1988. This sample was matched by tobacco use prevalence (in past week) and school size, and randomly assigned to either a control or an intervention condition.* Thus, 11 schools participated in the intervention condition and 11 participated in the control condition. Students were surveyed four times during the 3-year period, including a baseline assessment at the beginning of seventh grade (T1), and posttest assessments at the end of grades seven (T2), eight (T3), and nine (T4).

At the final (T4) posttest, 2668 (73%) of the initial cohort (i.e., those who were assessed at baseline) remained. The proportion of students lost to follow-up was similar for both the intervention and control conditions, and no differential attrition by condition across any relevant covariate was found. The cohort of 2668 participants comprised near equal proportions of males and females, and the average age at baseline was approximately 12 years

*Originally, 23 schools agreed to participate in Project SHOUT. However, at one of the schools, the students, who were predominantly Spanish speaking, were unable to complete the surveys owing to language and scheduling problems. Upon mutual agreement, this control school was dropped from the study, and these students were therefore not included in the analyses.

(range: 11 to 16 years). At baseline, 34% had at least one parent who used tobacco, and 21% had at least one close friend who used tobacco. With respect to ethnicity, 57% was White/non-Hispanic, 24% of the cohort was Hispanic, and 19% belonged to other ethnic groups, including African Americans, American Indians, Indochinese, Filipinos, Japanese, Chinese, and Pacific Islanders.

Of the 2668 students, 1174 (44%) were in the intervention group and 1494 (56%) were in the control group. To ensure that both groups were equivalent at baseline, a number of demographic and tobacco-related variables were examined. Comparisons showed that the groups did not differ in terms of gender, age, baseline tobacco use, percentage having a parent who used tobacco, or percentage having at least one close friend who used tobacco. However, with respect to ethnicity, significant differences ($P < .001$) were found between the two groups. Among the intervention students, Whites/non-Hispanics accounted for the largest proportion (51%), followed by Hispanics (28%) and then by Others (21%). Among the control students, Whites/non-Hispanics again accounted for the largest proportion (62%), followed by Hispanics (21%) and then Others (18%).

Recruitment and Training of Undergraduates

Undergraduates were recruited from San Diego State University during the first few weeks of the new semester. These students have proven to be highly motivated, easily trained and managed, and well received.¹¹ More than 100 undergraduates served as volunteers on the project during the 3 years of the intervention. Between 30 and 35 undergraduates served as classroom group leaders per semester while only 4 undergraduates were required per semester for the mail and telephone booster intervention. Undergraduates received units of college credit for their involvement, and attrition was rare.

School-Based Intervention

The intervention was initiated in 75 classrooms at 11 junior high schools during the participants' seventh- and eighth-grade years. Teams of undergraduate group leaders received about 15 hours of training from the SHOUT staff to lead six fall lessons (once a week) and four spring lessons (once a month) during the students' seventh-grade year. Training included instructions in how to teach effectively and how to implement SHOUT lessons. The leaders' role plays were vid-

eotaped and reviewed. Proficiency was evaluated by staff, and feedback was given both during training and later in the field.

The seventh-grade participants watched a videotape on the health consequences of tobacco use, read celebrity endorsements of nonuse, discussed the antecedents and social consequences of tobacco use, became familiar with tobacco products, rehearsed methods of resisting peer pressure, practiced decision making, wrote letters to tobacco companies describing their opinion on youth tobacco use, and performed a skit for their classmates in which they were offered tobacco and refused it.

The classes in the spring reviewed the refusal methods, discussed addiction to tobacco and cessation of use, and gave the students an opportunity to publicly declare themselves tobacco free. Students received T-shirts with the SHOUT logo. Students also attended an assembly to watch skits performed by their peers and a slide show of the past year's activities.

The eighth-grade curriculum (eight lessons scheduled once a month) included more demonstration and rehearsal of refusal skills. Students also estimated their health risk and wrote letters to magazine editors and film producers protesting tobacco advertising. Additionally, students participated in community action projects designed to mobilize them as anti-tobacco activists. They learned positive methods of encouraging parents and others to quit smoking, such as using assertive communication skills. Students also debated tobacco issues and attended an assembly reviewing the year's activity.

At the end of eighth grade, no statistically significant treatment effects between the conditions were detected, and it was decided to continue educating the cohort in the ninth grade. However, about half of the intervention participants transferred to senior high school for this grade, so the continuation of a school-based intervention was neither practical nor experimentally feasible. This led to the use of telephone and mail for this final year.

Mail and Telephone Boosters

In the first 2 years, volunteer undergraduates conducted intervention classes with approximately 25 to 35 students per class and with individual contact at a minimum. However, with the booster intervention, which used direct mail and phone calls, we were able to reach each participant individually and deliver a tobacco use prevention message somewhat tailored to

the participant's needs. For example, participants who were smoking were mailed cessation advice and materials.

Five newsletters were mailed periodically to the homes of SHOUT intervention participants (including those no longer in San Diego). Newsletters were written by project staff and the four volunteer phone counselors. Each four- to six-page newsletter included information regarding tobacco control events, legislation, research, and the tobacco industry's power; cessation tips; and a question-and-answer column. Additionally, two newsletters per year were mailed to the parents of the SHOUT participants.

About 1 week following newsletter distribution, phone calls began. The trained phone counselors made two telephone calls per semester to each SHOUT participant. Project staff trained the phone counselors based on an earlier Pawtucket Heart Health Program protocol.¹² Training was conducted for 2 hours prior to the introduction of a new phone call script, and it included information on communication skills, phone call objectives, handling refusals or problem situations, proper phone attitude, maintaining confidentiality, documenting phone call data, and schedules. Training also included role-playing scenarios of high and low interest to the SHOUT participants. Project staff monitored calls and met weekly with counselors to discuss more effective ways of communicating script content.

Counselors called weeknights from 4:00 to 7:30 for 6 weeks to complete the calls, which averaged approximately 5 minutes in length with a range from 1 to 45 minutes. The calls were designed to be as interactive as possible. Counselors asked open-ended questions to facilitate more conversational-type answers rather than simple yes/no responses. Phone calls began with a discussion of the most recent newsletter, highlighting one or two specific articles; they covered opinion polls, normative education instruction, refusal skills training, tobacco news, and tobacco cessation; and they ended with a plug for a local free cessation help line. The volunteer phone counselors achieved a 79.9% call completion rate, and the total cost of conducting this booster session (production and mailing of seven newsletters and added telephone expenses for four phone calls) was approximately \$4000.

Data Collection

Four surveys (T1, T2, T3, and T4), administered under bogus pipeline condi-

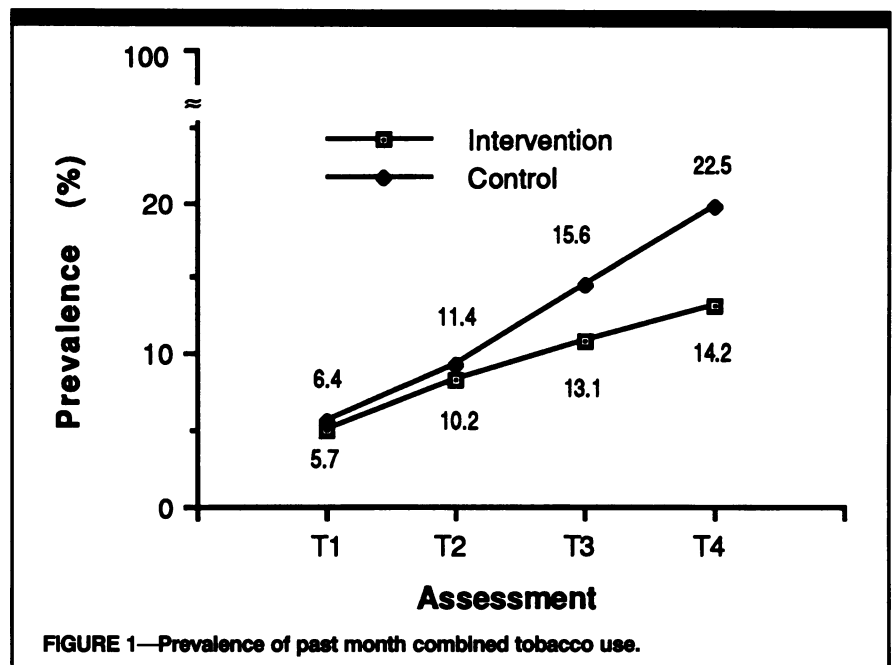


FIGURE 1—Prevalence of past month combined tobacco use.

tions^{13,14} by trained undergraduate volunteers in classrooms, were conducted during Fall 1988, Spring 1989, Spring 1990, and Spring 1991. Each survey elicited information on smoking and smokeless tobacco use, and on psychosocial and demographic characteristics relevant to such practices. Students not in attendance during the classroom survey were surveyed by the school liaison under explicit instructions. Students failing to complete either of these surveys were followed up with mail surveys using a series of postcard and telephone prompts and lottery incentives. Aggressive tracking procedures were used, and at final measurement (T4), the follow-up included 73% of the original cohort for a total of 2668 students.

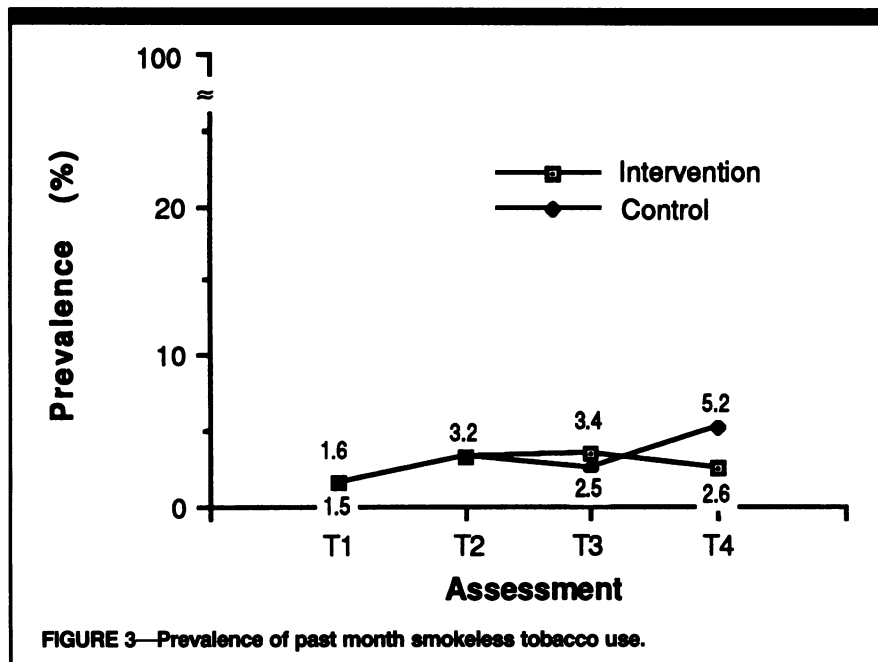
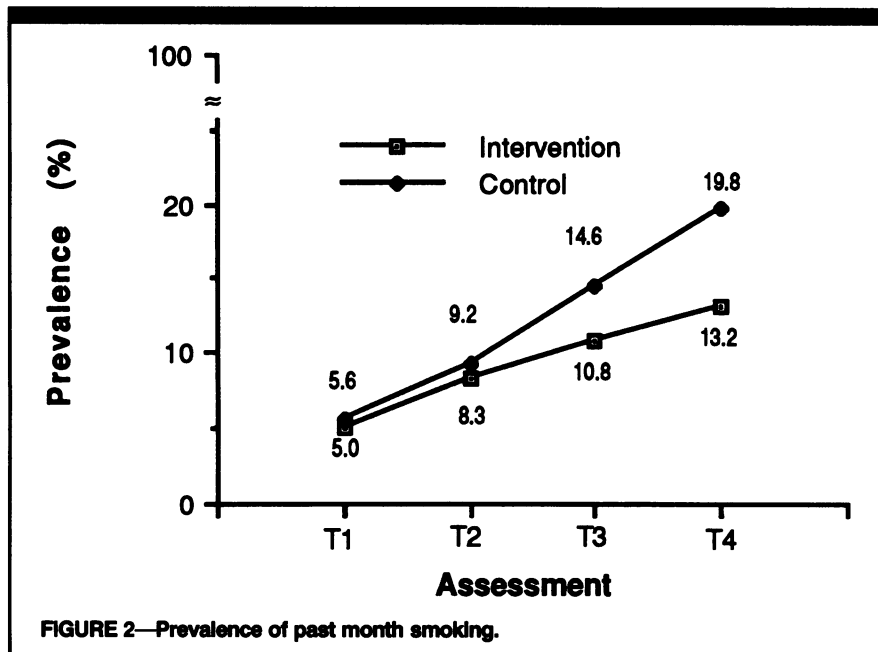
Analyses

Analyses were primarily focused on describing longitudinal trends in tobacco use for the cohort and testing for group differences at the final posttest assessment (T4). For these analyses, six tobacco use variables were considered: any use of smoking tobacco, smokeless tobacco, and either form together ("combined tobacco use") over the past month and the past week. Individual-level analysis at T4 was conducted by regressing tobacco use (1 = yes, 0 = no) onto condition (1 = intervention, 0 = control) using logistic regression. School-level analysis at T4 was conducted by computing the logit of the prevalence of use for each measure and then regressing this onto condition using weighted linear regression, with school

cluster size (i.e., number of students surveyed) serving as the weight. The parameter estimates were then exponentiated, yielding an estimate of the odds of tobacco use in the intervention group relative to the control group. Covariates, which were also modeled, included baseline tobacco use, gender, age, friend's tobacco use, and parental tobacco use. However, because the results for these analyses were consistent with those for the simpler models, the results presented here are those obtained from regressing tobacco use onto condition. In addition, because there were significant differences between the two groups in terms of ethnicity, subsequent analyses involved repeating the above steps separately for Whites, Hispanics, and Others.

Results

Figures 1 to 3 depict the prevalence of *past month* tobacco use for the three tobacco use measures at the four measurement periods. The prevalence rates were computed by averaging the percentage of tobacco users in each condition across schools. As can be seen in Figure 1, combined tobacco use rates for control and intervention conditions ran roughly parallel between the first two observation periods (T1 and T2), diverged slightly between the second and third periods (T2 and T3), and then reached their largest difference at the final follow-up (T4). Prevalence rates by condition specific to smoking tobacco (Figure 2) showed the same general pattern. Prevalence of past month



smokeless tobacco use showed no group differences across measurements, with the exception of a small difference in the expected direction at T4 (Figure 3). One should note the low prevalence of past month smokeless tobacco use at every assessment period. Smokeless tobacco use rates among this cohort were somewhat lower than those reported elsewhere for this age group (i.e., 6% to 8%),¹⁵ and results should be interpreted with caution.

Table 1 presents the results of the regression analyses of the T4 differences for past month tobacco use. For the total sample, all three forms of tobacco use showed statistically significant group differences

at both the school level and the individual level. In the subsequent subgroup analyses, statistical significance was achieved only among White students, although calculated odds ratios were similar for Whites and Hispanics.

Trends for *past week* tobacco use were similar to those seen for past month use. Group prevalence rates diverged slightly at T2 and T3, and differed substantially at T4. At T4, the control subjects' past week prevalence was roughly twice that of the intervention subjects for combined, smoking, and smokeless tobacco use. Again, because of the low prevalence of smokeless tobacco use dur-

TABLE 1—Odds of Past Month Tobacco Use among Intervention Students Relative to Control Students at Final Follow-Up

	Logit Model Odds Ratios	
	School Level	Individual Level
Hispanics		
Combined tobacco use	0.60	0.75
Smoking	0.62	0.77
Smokeless tobacco use	0.47	0.40
Whites		
Combined tobacco use	0.61*	0.67***
Smoking	0.72	0.76*
Smokeless tobacco use	0.54	0.59
Others		
Combined tobacco use	1.01	0.94
Smoking	1.27	1.12
Smokeless tobacco use	0.33	0.64
Total sample		
Combined tobacco use	0.71*	0.72***
Smoking	0.77*	0.79*
Smokeless tobacco use	0.47**	0.56*

*P < .05; **P < .01; ***P < .001.

ing the past week, results related to smokeless tobacco must be considered tentative. Results of the regression analysis at T4 for past week tobacco measures showed that, for the total sample, only the difference in combined tobacco use achieved statistical significance at both the individual and the school levels (Table 2). With respect to the subgroup analyses, significance at the individual and school levels was attained for smoking tobacco use among Hispanics but not for any measure among Whites or Others.

Random Effects Model

Although encouraging, these results bring into question the effect of any particular school, or cluster, on an individual subject. Given identical curriculum implementation of the tobacco prevention program, would socioeconomic environmental factors from one particular school influence a student's decision to abstain from tobacco use more or less than they would at any other school chosen at random? Possible school-specific characteristics that could affect a subject's willing-

ness and determination to abstain from tobacco use are economic condition, presence of gangs, prevalence of illegal drug and alcohol use, peer pressure, local lifestyle trends and fashions, general attitudes toward authority, environmental factors affecting psychological outlook (e.g., presence of gang graffiti, provision of adequate athletic facilities), and adequacy of role modeling on the part of teachers and school staff.

To assess the generalizability of the results of the logistic model across schools (clusters), a two-level random effects model was developed according to recent methods presented by Hedeker et al.¹⁶ Schools were considered as a random sample from a population of schools sharing common characteristics of measurements distributed normally; each school was then considered as having a random effect on student outcomes. In this analysis, individual subjects were nested within their respective schools. Estimated effects for school were computed, with results showing negligible contribution (.02%) toward accounting for the divergence between the groups seen over the course of the study, primarily between T3 and T4. We conclude that the methods used throughout the intervention were effective regardless of which school a particular student attended. On the other hand, individual student effects were significant (accounting for 13% of the variance). Therefore, we conclude that the intervention program was effective for students in schools quite diverse in social, economic, and demographic characteristics.

Discussion

SHOUT uses techniques common to many tobacco use prevention programs, including an emphasis on interpersonal behavior aimed at countering peer pressure to initiate use of cigarettes and smokeless tobacco. Also emphasized are the use of community activism, positive reinforcement for abstinence, and undergraduate facilitators, and the transfer to telephone and mail contact only in the later stages of the program.

Intervention results for SHOUT were fairly compelling, especially for cigarette smoking. The low prevalence of smokeless tobacco use made it difficult to detect significance for the prevention of this habit. Although the project was originally designed to target smokeless tobacco use, the prevalence rates for smokeless tobacco use in San Diego, even

in rural areas, are not comparable to those reported nationally.¹⁵

That the combined tobacco use results were significant at the school level of analysis were especially of interest to the present project given the schoolwide nature of the intervention programs. The intervention's effectiveness, however, was only somewhat apparent after the second year of intervention and was fully manifested only after the third year. Thus, unlike similar programs,^{2,3} SHOUT's results increased consistently over 3 years of intervention. Even though the third-year intervention consisted only of newsletters and phone calls, it is quite possible that without this additional booster the trend separating the prevalence rates of the control and intervention groups would not have been extended. Future studies should address whether a long-term intervention (i.e., through high-school) is necessary to achieve change in lowering the prevalence of tobacco use. Such studies are warranted, given recent reports of small or even no effects in long-term follow-up of junior high school-aged intervention subjects.^{2,3} All results described in the present study were consistent across setting and population characteristics such as school size and ethnicity groups; however, SHOUT was especially effective for medium- to smaller-size schools and for the Hispanic ethnic group.

Three other aspects of the SHOUT intervention can be tested for determining the effectiveness of its specific components. First, college student facilitators appear to be effective change agents, especially given both their sense of responsibility (and the fact they earn credit for the intervention) and their relative youth and ability to relate to junior high school students. Future studies may want to compare and contrast the use of these change agents to that of professional full-time teachers and similar-age peers. College students as facilitators in behavior modification among grade school youth may be just as effective in other socially oriented health areas such as drug and alcohol use prevention.

Second, an important component of the SHOUT intervention was the use of community activism and positive reinforcement for behavioral change. Researchers interested in the effectiveness of these components may want to isolate them in differential treatment studies.

Finally, of particular interest in the SHOUT intervention was the use of minimal contact (mail and telephone) techniques in the personalized yet final (ninth-

TABLE 2—Odds of Past Week Tobacco Use among Intervention Students Relative to Control Students at Final Follow-Up

	Logit Model Odds Ratios	
	School Level	Individual Level
Hispanics		
Combined tobacco use	0.44	0.47**
Smoking	0.40*	0.45***
Smokeless tobacco use	0.53*	0.46
Whites		
Combined tobacco use	0.73	0.72*
Smoking	0.84	0.79*
Smokeless tobacco use	0.92	0.76
Others		
Combined tobacco use	1.36	1.19
Smoking	1.50	1.25
Smokeless tobacco use	0.98	1.33
Total sample		
Combined tobacco use	0.66*	0.71***
Smoking	0.69	0.75*
Smokeless tobacco use	0.51	0.76

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

grade) year. This component holds a substantial amount of public health promise, given its cost-effectiveness. Future intervention studies should assess the differential effectiveness of the minimal telephone/mail approach contrasted to the more traditional time- and resource-intensive direct classroom interventions. □

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