

Project Towards No Drug Abuse: Long-term substance use outcomes evaluation

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Abstract

Objectives. This paper presents up to 5 years post-program outcomes of Project Towards No Drug Abuse (Project TND), a drug abuse prevention program conducted in South California alternative high school system during years 1994–1999.

Methods. The effects of a 9-session health motivation–social skills–decision-making curriculum were evaluated. Twenty-one schools recruited were randomly assigned to standard care (control), classroom only, or a classroom plus semester-long school-as-community component. Last 30-day use of cigarettes, alcohol, marijuana, and hard drugs were assessed at three time intervals: short-term (year 1), middle-term (years 2 or 3), and long-term (years 4 or 5). Multilevel random coefficients modeling were employed to estimate the adjusted levels of substance use.

Results. Among 1578 baseline subjects, follow-up data were available for 68% (year 1), 66% (years 2 or 3), and 46% (years 4 or 5) of subjects, respectively. Results revealed significant positive long-term program effects for hard drug use at year 4 or 5 for the two program interventions ($P = 0.02$).

Conclusions. Project TND reduced hard drug use in the 46% who were successfully followed. It is the first program to demonstrate long-term self-reported behavioral effects on hard drug use among high-risk youth by using a school-based, limited-session model.

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Introduction

Project Towards No Drug Abuse (Project TND) was developed as a classroom-based drug abuse prevention program among continuation (alternative) high school youth. Continuation high school (CHS) youth have transferred out of the regular system due to functional problems (e.g., lack of credits, drug use, etc.) (Sussman et al., 1998). These youth are at high risk for drug abuse compared to those attending regular high schools (Simon et al., 1994; Sussman et al., 1998; Hoffmann et al., 2000; Sussman, 1996; Newcomb et al., 1987). The Project TND classroom-based curriculum used in this study consists of nine sessions and provides health motivation–social skills–decision-making material specifically targeting the use of cigarettes, alcohol, marijuana, and hard drug use (Sussman et al., 1998).

The first set of sessions motivates students to listen to subsequent programming and instructs effective listening skills. The second set of sessions instructs students in chemical dependency issues and alternative coping skills. The third set of sessions encourages making no-drug-use choices.

In addition to the classroom curriculum, the school-as-community concept was used to develop a community program component in which students participated in activities sponsored by the school but outside the classroom (Sussman et al., 1997). The hypothesis here was that provision of drug abuse material outside of the classroom, involving use of extra-classroom activities that make a limited movement outward to the nearby community, would enhance the effectiveness of classroom-based programming.

Prior findings

In a previous paper, self-reported behavioral results at 1-year follow-up revealed that students from schools in either

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program condition exhibited a 25% reduction in hard drug use prevalence rates, relative to students from the control schools (Sussman et al., 1998). In addition, a 7% reduction in alcohol use prevalence was observed for students in either program condition, relative to controls, but only among those who were using alcohol at baseline (64% of the sample). No reduction effects, relative to controls, were found on the prevalence of cigarette or marijuana use.

Present study

The purpose of this paper was to test the long-term (i.e., up to 5 years post-program) impact of Project TND among CHS youth, delivered alone or in combination with a set of student-organized anti-drug activities outside the classroom. Given the strong preventive effects found for hard drug use in the 1-year follow-up evaluation, it was hypothesized that (a) the classroom program condition would continue to provide a reduction in substance use rates, most notably for hard drug use, compared to rates observed in control schools; and (b) the addition of extracurricular activities to the classroom program (i.e., classroom plus a semester-long school-as-community component) would provide a greater reduction than the classroom program alone in the long run. Propensity score analysis was conducted. The results from multilevel models were presented.

Methods

Experimental design

Project TND recruited 29 school districts from southern California. Using randomized blocking procedures, 21 CHSs were assigned to standard care (control; $n = 7$), classroom only ($n = 7$), or classroom plus a semester-long school-as-community component ($n = 7$). The design called for the delivery of the curriculum to all students enrolled at the non-control schools and pre- and post-program survey of all students. Follow-up survey of all students was at immediate, 12-, 24-, 36-, 48-, and 60-month post-program.

Subjects

1867 students were eligible at pretest, and 1578 of them were consented and completed the pretest survey. To increase the sample size for analysis, survey data at years 2 and 3 were combined as middle-term follow-up data, and years 4 and 5 were combined as long-term follow-up data. Among the 1578 subjects with pretest measures, 1047 (66%) and 725 (46%) subjects had middle- and long-term follow-up data, respectively. A total of 530 subjects (34%) had complete data at all 4 time points: pretest, short-term, middle-term, and long-term.

Data collection

The data collection methods used in Project TND were described in detail in a previous 1-year outcomes paper (1). The majority of follow-up students were surveyed by telephone interview (year 1: 77%; year 2: 82.5%). Follow-up surveys for year 3 to year 5 were administered by telephone interviews only. Telephone surveys were used because research with groups including high-risk youth has shown that this approach is a successful method of reaching subjects who are not accessible through other means (McCuller et al., 2002). Telephone surveys yield much higher rates of completion than mail surveys, and most research shows that they lead to negligible differences in responses compared to face-to-face interviews (McCuller et al., 2002; Miller and Rollnick, 1991).

Measures of substance use

The primary outcome measure was last 30-day substance use. Questions were directed to frequency of use of cigarettes, alcohol, marijuana, cocaine (crack), hallucinogens (LSD, acid, mushrooms), stimulants (ice, speed, amphetamines), inhalants (rush, nitrous), and other drugs (depressants, PCP, steroids, heroin, etc.). Responses to the last five substance categories (cocaine through other substances) were summed to form a hard drug use index (Cronbach's alpha at pretest = 0.82) (Sussman et al., 1998). Data from years 2 and 3 and years 4 and 5 were combined separately to form a substance use measure for middle- and long-term follow-up durations, respectively. The combination was conducted such that when measures were available from both surveys, the maximum value was used; when there was only one survey available for that time point, the value from that survey was used as the value at that time point.

Analytic method

From the pretest measures in the present study, the intraclass correlation coefficients for cigarettes, alcohol, marijuana, and hard drugs were 0.08, 0.01, 0.1, and 0.01, respectively. In order to properly compute P values for statistical tests of differences between groups, multilevel random coefficients analytic models were applied because of the clustered random assignment (Murray et al., 1996).

Prediction of level last 30-day cigarette, alcohol, marijuana, and hard drug use from pretest use level, program condition, schools nested within condition, method of follow-up collection, and the interaction between pretest level of use and condition was conducted (Murray et al., 1996). Aside from calculating an overall condition effect ($df = 2,18$), two a priori orthogonal condition mean contrasts were calculated: the classroom-only program intervention condition versus the standard care control condition and the classroom plus school-as-community condition versus the classroom-only condition (each with $df = 1,18$). Mean comparisons were evaluated at $P < 0.05$, one-tailed, since directional hypotheses were stated.

Results

Out of the pretest sample of 1578 consented subjects, short-term, middle-term, and long-term follow-up data were successfully collected and analyzed for 1074, 1047, and 725 subjects, respectively. Subjects at pretest ranged from 14 to 19 years of age (mean age (SD) is 16.8 (0.9) years), while 55.4% were male. In addition, 31.6%, 49.5%, 9%, and 9% of subjects were White, Hispanic, African American, and other ethnicity, respectively. While mean age increased 1 year per year of survey with a consistent SD and percent male failed to vary, ethnicity varied slightly over time. The percentages were 33.8%, 49.8%, 8.2%, and 8.2% in short-term, 33.1%, 50.4%, 7.6%, and 8.9% in middle-term, and 34.5%, 50.8%, 6.1%, and 8.6% in long-term follow-up sample, respectively.

Attrition

The retention rates in the standard care, classroom only, and the classroom plus school-as-community conditions were 67%, 66%, and 71% for short-term, 69%, 64%, and 67% for middle-term, and 49%, 43%, and 47% for long-term follow-up. These attrition rates were not significantly different across conditions (all P 's > 0.1). The comparability of 10 behavioral and demographic measures of interest at pretest between the initial sample and the retained samples was tested using a series of t tests. No significant differences

were found for any of the 10 variables between the initial sample and the short-term follow-up sample (see Sussman et al., 1998). However, the proportion of participants living with both parents differed between the initial and middle-term follow-up samples (44.5% and 47.8%, respectively; $P = 0.03$) and the initial and long-term follow-up samples (44.5% and 50.4%, respectively; $P = 0.001$). Furthermore, the proportion of African Americans differed between the initial and long-term follow-up samples (44.5% and 47.8%, respectively; $P = 0.001$).

Comparability between the retained sample and dropouts at the middle-term and long-term follow-ups was supported by propensity score analysis (Rosenbaum and Rubin, 1983), in which treatment condition, pretest substance use, age, gender, ethnicity, acculturation, living with both parents, and parents' average education level were the covariates. Auxiliary multi-level logistic regression models were calculated in which middle-term, long-term, and "full" (subjects with complete follow-up survey data) follow-up retention status was predicted within the pretest sample of 1578 subjects by the above covariates. The predicted values from these models (the propensity scores) were used in the main analysis models as one of the covariates. Propensity score analyses did not reveal significant differences on the pretest measures between the pretest sample and the follow-up samples. We found that the

retention propensity score covariate did not lead to significant changes in program effects.

Assessment of program effects on drug use

The characteristics of 30-day substance use at each time point are summarized in Table 1 by program condition. Pretest substance use levels in the overall sample were 32.1, 11.8, 18.3, and 5.7 for cigarettes, alcohol, marijuana, and hard drugs, respectively. Table 2 provides a tabular presentation of the outcomes data from propensity score analyses. The model for hard drug use at short-term follow-up indicated a significant program effect ($F = 3.85$, $P = 0.04$). The analyses of the middle-term follow-up data showed no significant program effects for any substance use (cigarettes, alcohol, marijuana, and hard drugs). However, a significant long-term program effect was revealed for hard drug use ($F = 4.71$, $P = 0.02$). The long-term program effect was still significant ($F = 6.85$, $P = 0.01$) from a supplementary analysis, in which the propensity score was not controlled for in the random coefficient model. In Table 2, at long-term follow-up, compared with those in the control group, the group who received the classroom-only intervention had less than half of the last month drug use frequency, and the group who received classroom plus school-as-community

Table 1
Summary of 30-day substance use at various time points by program condition

	Control		Class		SAC	
	% of users	Mean \pm SD	% of users	Mean \pm SD	% of users	Mean \pm SD
<i>Pretest (Control: n = 474 Class: 571 SAC: n = 533)</i>						
Cigarettes	56.5	28.8 \pm 38.5	56.5	30.2 \pm 39.3	60.0	37.2 \pm 42.5
Alcohol	63.6	12.9 \pm 23.0	63.6	11.9 \pm 20.7	65.5	10.9 \pm 20.6
Marijuana	56.9	20.8 \pm 31.8	54.0	17.2 \pm 28.7	54.7	17.4 \pm 28.8
Hard drugs	33.9	11.0 \pm 37.2	31.8	8.3 \pm 34.1	28.1	7.4 \pm 31.6
<i>Year 1 follow-up (Control: n = 318 Class: n = 375 SAC: n = 381)</i>						
Cigarettes	48.6	28.3 \pm 40.5	51.7	33.4 \pm 43.7	55.7	36.5 \pm 44.2
Alcohol	57.6	8.5 \pm 20.6	57.9	7.8 \pm 18.3	60.2	7.5 \pm 17.2
Marijuana	42.1	12.4 \pm 27.6	39.6	10.5 \pm 24.7	43.6	14.0 \pm 28.5
Hard drugs	21.8	5.0 \pm 23.9	18.5	1.9 \pm 9.7	17.2	3.3 \pm 16.1
<i>Year 2 or 3 follow-up (Control: n = 326 Class: n = 364 SAC: n = 357)</i>						
Cigarettes	53.2	28.1 \pm 43.7	55.1	32.5 \pm 43.3	53.5	32.5 \pm 43.5
Alcohol	61.2	9.0 \pm 20.6	65.0	9.4 \pm 21.2	70.2	9.4 \pm 20.8
Marijuana	37.5	10.0 \pm 24.7	36.3	9.2 \pm 23.2	40.2	10.4 \pm 25.5
Hard drugs	13.5	1.7 \pm 9.7	16.3	2.0 \pm 12.5	16.0	1.6 \pm 9.0
<i>Year 4 or 5 follow-up (Control: n = 232 Class: n = 243 SAC: n = 250)</i>						
Cigarettes	68.9	43.7 \pm 54.0	76.4	52.3 \pm 45.6	68.3	48.5 \pm 57.1
Alcohol	73.3	10.3 \pm 21.1	73.6	10.1 \pm 36.3	77.4	8.9 \pm 17.3
Marijuana	34.5	7.9 \pm 20.9	30.6	7.0 \pm 18.9	33.2	7.3 \pm 20.5
Hard drugs	7.8	1.4 \pm 9.7	9.9	0.6 \pm 3.5	10.1	0.3 \pm 1.3

Notes. Subjects were youth in the Southern California alternative high school system participating in Project Towards No Drug Abuse (Project TND) during years 1994–1999.

Control: standard care control; Class: classroom-only program condition; SAC: classroom plus school-as-community condition.

% of Users: the proportion of subjects who reported any substance use (1–100+ times) in the last 30 days.

Mean: average number of times a substance was used in the last 30 days.

Hard drug use was an index which summed use of cocaine (crack), hallucinogens (LSD, acid, mushrooms), stimulants (ice, speed, amphetamines), inhalants (rush, nitrous), and other substances (depressants, PCP, steroids, heroin, etc.).

Table 2
Program effects for project TND at follow-up years. Adjusted mean levels of 30-day substance use^a by program condition

	Adjusted means at follow-up ^b			Condition effect	
	Control	Class	SAC	<i>F</i> (2,18)	<i>P</i> ^c
<i>Follow-up year 1 (n = 1074)</i> ^d					
Cigarettes	30.7	34.5	33.1	0.16	0.64
Alcohol	8.61	8.15	7.16	1.11	0.02
Marijuana	11.21	12.31	13.02	0.07	0.75
Hard drugs	5.03	2.74	2.87	3.85	0.04*
<i>Follow-up year 2 or 3 (n = 1047)</i>					
Cigarettes	29.5	30.3	31.9	0.09	0.91
Alcohol	9.03	9.59	9.30	0.05	0.95
Marijuana	9.81	9.19	10.49	0.27	0.77
Hard drugs	1.78	2.05	1.62	0.12	0.89
<i>Follow-up year 4 or 5 (n = 725)</i>					
Cigarettes	45.9	51.5	49.3	0.24	0.79
Alcohol	10.2	10.1	8.5	0.35	0.71
Marijuana	7.73	7.16	7.43	0.03	0.97
Hard drugs	1.51	0.66	0.30	4.71	0.02*

Notes. Control: standard care control; Class: classroom-only program condition; SAC: classroom plus school-as-community condition.

^a Mean level of substance use was assessed by the average number of times a substance was used in the last 30 days.

^b At the middle- and long-term follow-ups, the reported means were adjusted for baseline use level, the interaction between condition and baseline level, and the propensity score for retention.

^c *P* values were computed with two-tailed probability tests for condition effects (program).

^d Results for 1-year follow-up were analyzed and reported in a previous paper for 1 year outcome (1).

* *P* < 0.05.

component showed about one fifth the last month drug use frequency (*P* < 0.05). The contrast of classroom-only condition versus classroom plus school-as-community component condition was not significant (*P* = 0.25).

From 530 subjects with complete survey data, adjusted means of hard drug use for each follow-up time point were calculated, depicted in Fig. 1. Within the 530 subjects, the two intervention conditions showed positive long-term effects on the prevention of hard drug use. This analysis yielded compatible results with those depicted in Table 2, where maximum, but not identical number of subjects, were included in each of the follow-up time points.

Discussion and conclusions

This paper is the first to examine the long-term substance use program effects of the 9-session version of Project TND. The present investigation demonstrated long-term maintenance effects for 30-day hard drug use among these continuation high school students. Specifically, at years 4 and 5, compared with those in the control group, the group who received the classroom-only intervention had less than half of the last month drug use frequency, and the group who received classroom plus school-as-community component as well showed about one fifth the last month drug use frequency. However, significant reductions were not found for 30-day use

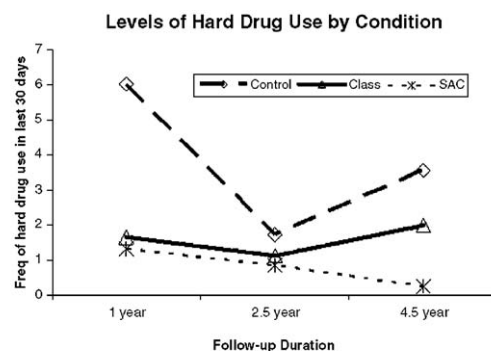
of cigarettes, alcohol, or marijuana use. Because we did not find the significant maintenance effects for 30-day hard drug use from year 2 and 3, this might only be a random finding or a finding reflecting a program that was successful only in those who were retained in the follow-up sample.

It is not certain why a long-term behavioral effect was only achieved on hard drug use, but not on cigarette, alcohol, or marijuana use. It is likely that youth perceive these drugs as relatively safe compared with hard drug use. A second explanation for finding significant reductions for hard drug use, but not for cigarettes, alcohol, or marijuana may be that a prevention program must have strong initial positive effects if maintenance effects are expected to persist in the long-term (Skara and Sussman, 2003). Because Project TND was initially effective (at year 1) in reducing hard drug use among the target audience, providing a moderate effect size, it increased the possibility that program effects would be observed at future long-term follow-up evaluations.

Another explanation for finding significant reductions for hard drug use considered across program and control conditions may be routine maturation that occurred among the youth (Brook et al., 2002). The stability of cigarette smoking from high school graduation over the next 10 years is very high for cigarette smoking, is moderately high for alcohol and marijuana use, but decreases dramatically for other illicit substance use (Bachman et al., 1997; Rohrbach et al., 2005). This dramatic decrease in hard drug use suggests a maturing out, or increasing fear of enforcement efforts, away from illegal drug use, particularly hard drug use.

Although the present project demonstrated that a school-as-community component could be implemented successfully for long-term substance abuse prevention (Sussman et al., 1997), this component did not add an incremental long-term effect to that of a classroom-only program (just like the short-term effect; Sussman et al., 1998). Possibly, school-as-community program efforts need to involve a larger percentage of the school community than in the present study or must include numerous community components outside of the school to be effective.

Booster programming may be a necessary component for effective programming. Consistent with previous research



Notes.
a. The subjects in the analysis were limited to those 530 subjects with non-missing follow-up data at all three follow-up durations.
b. At the one year follow-up, the reported means were adjusted for baseline use level, the interaction between condition and baseline level, and the data collection method. At the middle- and long-term follow-ups, the reported means were adjusted for baseline use level, the interaction between condition and baseline level, and the propensity score for retention.
c. Control, standard care control.
d. Class, classroom-only program condition.
e. SAC, classroom plus school-as-community condition.
f. Level of hard drug use was assessed by the frequency of hard drug use in last 30 days.

Fig. 1. Adjusted mean levels of use in the last 30 days by condition.

(Flay et al., 1989; Dusenbury and Falco, 1995), program effects are less likely to decay if programming includes delivery of booster sessions as a supplement to the program curricula. In fact, results of a review study (Skara and Sussman, 2003) found that, of the programs that provided booster sessions, the majority had maintained long-term reductions for cigarette, alcohol, and marijuana use at final follow-up testing (ranging from 2 to 15 years post-program).

The primary limitation of the present study is low long-term follow-up rate (46%). The finding from this present study is actually that, in the 46% who were successfully followed, there is some intervention effect. It is possible that the remainder of the adolescents, who were already marginalized given that they were in alternative schools, were also performing marginal behaviors, including drug use. Furthermore, it is possible that the observation of the control group might be better than the treatment groups because the variability in the adolescents not followed may be much greater than in those followed. On the other hand, Collins et al. (2001) showed that, even with an attrition rate of 50% and the data missing not at random, the program effect was still relatively unbiased, unless the correlation between the cause of “missingness” and the dependent variable was very large ($r = 0.90$). Correlations even as high as $r = 0.50$ are rare in prevention research. We have experienced little such bias in Projects TND-1.

The present findings do need to be tempered by the fact that program effects failed to be found for years 2 and 3, and program effects failed to be found for cigarettes, alcohol, and marijuana. While effects on cigarette smoking and marijuana use were found in our subsequent 12-session TND program (Sussman et al., 2002, 2003) up to 2-year follow-up, effects at a longer-term follow-up were not assessed. In addition, one must not ignore the issue of potential dropout of those least likely to benefit from the program, a contention which arguably is supported by the substantial decreases in use of all substances in the control group.

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