



Initial Indicators of Effectiveness for a High School Drug Prevention Program

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ABSTRACT

All Stars, Sr. is a comprehensive high school health education supplement designed to prevent high-risk behaviors among adolescents. The program includes topics such as personal health, nutrition, interpersonal relationships, and stress, with a special emphasis on drug prevention. Effective research-based programs that target late onset prevention and early cessation of high-risk behaviors among high school students are not yet widely available. All Stars, Sr. fills this need by providing high schools with a program that promotes positive change in research-based mediating variables. The purpose of this study was to conduct an initial evaluation of All Stars, Sr. to examine program effects on drug use as well as mediating variables related to other high-risk behaviors. Six suburban high schools in North Carolina were randomly assigned to treatment and comparison conditions. Immediate pre- and posttest surveys were used to evaluate program effects. Results indicate that students exposed to All Stars, Sr. became increasingly likely to view drug use, poor nutrition, and stress as not fitting with their desired future lives. Additionally, students who participated in All Stars, Sr. were significantly less likely to have smoked cigarettes, and they demonstrated a trend toward less drunkenness than comparison students.

Federal programs, notably the Safe and Drug-Free Schools program of the U.S. Department of Education, now mandate the adoption of research-based approaches to prevention. Most drug prevention programming that has been developed and tested in school settings has addressed prevention in the fifth, sixth, and seventh grades (Tobler & Stratton, 1997). These primary prevention efforts target students at the time of drug use onset. There is strong evidence that this developmental period is an ideal time for preventive intervention (Hansen, 1992; Tobler & Stratton, 1997).

In contrast, there has been little atten-

tion given to primary prevention among high school students. Efforts to date have emphasized interventions primarily targeted at individuals who show evidence of already having behavioral problems including problematic drug use (Eggert, Thompson, Herting, Nicholas, & Dicker, 1994; Thompson, Herting, & Nicholas, 1995). There are few high school programs that universally target primary drug prevention (e.g., Johnson, Hansen, Collins, & Graham, 1986). Moreover, there are no widely disseminated programs specific to drug prevention with proven efficacy that address late onset prevention and early self-

directed cessation.

During high school the use of substances intensifies and problematic use emerges. For example, the proportion of students who report smoking on a daily basis doubles between 8th and 12th grade (Johnston, O'Malley & Bachman, 1997). Many studies have found that by high school the effects of middle school prevention programming

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disappear (Murray, Davis-Hearn, Goldman, Pirie & Luepker, 1988). Even when substance use is suppressed, onset continues throughout high school. It is clear that effective high school prevention programs are needed.

All Stars, Sr. is a program developed to deter substance use, reduce participation in other health compromising behaviors, and promote wellness among high school students. Activities are highly interactive and are designed to supplement the content of nine widely available high school health textbooks. The program provides teachers with detailed lesson plans for activities that address attitudes, skills, beliefs, and motivation relevant to promoting healthy behavior.

A goal of program design was to develop a curriculum that would fit within a general health education framework. All Stars, Sr. includes instruction in the 10 content areas that constitute comprehensive school health education (Centers for Disease Control and Prevention, 2000): community health; consumer health; environmental health; family life; mental and emotional health; nutrition; personal health; chronic and infectious disease prevention and control; safety and accident prevention; and substance use and abuse. A review of state health education frameworks (Wyrick, Wyrick, Bibeau, & Fearnow-Kenney, 2001) revealed that states have universally adopted these content areas.

All Stars, Sr. is a research-based program. Research-based prevention programs are designed to produce changes in targeted mediators or modifiable risk and protective factors (Hansen & McNeal, 1996). The most effective prevention programs have included a focus on a limited set of mediators. These include drug refusal skills (Goldberg, MacKinnon, Elliot, Moe, Clarke, & Cheong, 2000), normative beliefs (Hansen, 1996; Perkins & Berkowitz, 1986; Steffian, 1999), beliefs about consequences (Ellickson, Bell, & Harrison, 1993), and broader life skills (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995). Several programs that target these mediators have had long-term effects on tobacco, alcohol,

and marijuana use (Botvin et al., 1995; Eggert et al., 1994; O'Donnell, Hawkins, Catalano, Abbott, & Day, 1995). These programs have also produced reductions in antisocial behavior, school behavior problems, and affiliation with deviant peers and improvements in academic skills and commitment to school (O'Donnell et al., 1995; Spoth, Redmond, Haggerty, & Ward, 1995). Recent research (Hansen & McNeal, 2001) has demonstrated that many of these same variables are related to self-initiated cessation from substance use among adolescents.

In light of this research, All Stars, Sr. targets (1) adoption of positive normative beliefs, (2) commitment to avoid high-risk behavior, (3) lifestyle incongruence (e.g., perceiving substance use to not fit with one's desired lifestyle), (4) beliefs about social and psychological consequences, and (5) resistance skills. A secondary emphasis is placed on improving (6) goal-setting skills (7) stress management skills, and (8) decision making skills.

The purpose of this study was to conduct an initial, exploratory evaluation of All Stars, Sr. to examine program effects on drug use as well as mediating variables.

METHODS

Participants

Students from six schools in North Carolina were recruited to participate in the evaluation of All Stars, Sr. A written description of the study and an informed consent form were sent home to parents or guardians by the students. Participation in the pretest and posttest surveys depended on active parental consent and student assent. The treatment group consisted of 406 students, 153 boys and 253 girls. Students' ages ranged from 13–19 years. Ethnicity was roughly evenly split between White (46.2%) and African American (44.2%) students with very few Asian (1.9%), Hispanic (1.4%), Native American (1.2%), and Pacific Islanders or others (5.1%). The no-treatment comparison group consisted of 247 students, 110 boys and 137 girls. Comparison students' ages ranged from 13–18 years. The ethnic composition of the com-

parison group was White (53.6%), African American (27.8%), Asian (7.9%), Hispanic, (2.0%), Native American (2.4%), and Pacific Islander or other (6.3%).

Design and Procedure

Three schools were assigned at random to be treatment schools and three as comparison schools. The evaluation covered the entire 1999–2000 academic school year.

Five treatment teachers participated. Treatment teachers were given 2 days of training prior to the start of the school year. Teachers were asked to implement a minimum of two All Stars, Sr. activities per 1 week of health instruction. The selection of activities and time of implementation were left to the discretion of each teacher. Certain activities that were expected to be essential to program success were heavily promoted to increase the likelihood of their inclusion. Reports from teachers revealed that overall 60–75% of the 67 available activities were implemented.

Measures

Treatment and comparison students completed an 80-item survey prior to program implementation and again after the program was completed. The survey assessed the following eight mediators: (1) lifestyle incongruence; (2) normative beliefs; (3) commitment; (4) resistance skills; (5) beliefs about consequences; (6) bonding; (7) stress management skills; and (8) goal setting skills. In addition, three dichotomous items (yes or no) assessed recent (past 30 day) drunkenness, cigarette smoking, and marijuana use. Measures for assessing mediators were adapted from items used in the evaluation of the All Stars Core program (Harrington, Giles, Hoyle, Feeney, & Yungbluth, 2001). A total of 23 scales were used to assess (where applicable) each mediator in relation to drug use, violence, nutrition, physical activity, and stress. Internal consistency of scales was assessed by calculating Cronbach alpha coefficients, summarized in Table 1. Goal-setting skills had the highest overall average alpha coefficient ($\alpha=.87$). Overall, drug-specific scales performed well in terms of internal consistency (average overall $\alpha=.75$) with



commitment to avoid drug use having the second highest observed average alpha coefficient ($\alpha=.81$). The reliability of all other scales was in the acceptable range. To establish evidence of criterion validity, correlations between all scales measuring drug-related mediators (i.e., lifestyle incongruence, normative beliefs, commitment, resistance skills, and beliefs about consequences) and the three substance use outcome measures were calculated. As expected based on previous literature, these measures were negatively associated with substance use at both the pretest and posttest occasions ($p's<.001$). Correlations among the scales assessing the mediators related to each behavior also provided evidence for discriminant validity. Within behaviors, they were moderate in size (range for substance use .42–.69; violence .30–.45, nutrition .12–.40, and physical activity .45–.64), indicating that they did indeed measure distinct constructs relating to each behavior outcome.

Analyses are based on students present at both pretest and posttest surveys. The attrition rate for the treatment group from pretest to posttest was 17.6% and was 16.8% for comparison students. The only demographic difference between those who did and did not complete the study was age. Those who dropped out of the study were slightly older than those who completed both surveys ($t(610)=2.31, p<.025$). Students who dropped out of the study were no more likely to report being drunk in the past 30 days, but they did report greater cigarette (29 vs. 13%) and marijuana use (15 vs. 6%) as compared with program completers.

RESULTS

Effects of All Stars, Sr. on Mediators

Program effects on the targeted mediating variables were assessed via a series of hierarchical multiple regression analyses. The first step in each analysis controlled for the effects of the student's gender and age. A student's pretest score on the specific mediating variable was controlled in the second step. Contrast coding was used to

represent ethnicity, and the coded variables were entered in the third step. These variables tested for differences between African-American and White students and these two groups versus all other ethnic categories. The fourth and final step of the analysis was used to test for significant differences in posttest mediating variable scores between comparison and program students.

Lifestyle Incongruence for Drug Use

The overall model predicting lifestyle incongruence for drug use was significant ($R^2=.397, F_{(6, 476)}=52.24, p<.001$). Pretest scores on this mediator were unsurprisingly the strongest predictor ($\beta=.588, p<.001$) of lifestyle incongruence. The main effect of ethnicity was significant such that African American students reported higher (more desirable) scores on lifestyle incongruence for drug use than did White students ($\beta=.073, p<.05$). After controlling for the pretest scores and demographic variables, students receiving All Stars, Sr. reported higher posttest scores than did the comparison students ($\beta=.107, p<.01$).

Lifestyle Incongruence for Nutrition

The overall model predicting lifestyle incongruence for nutrition was significant ($R^2=.279, F_{(6, 476)}=30.66, p<.001$). Girls had higher scores on this mediator than did boys ($\beta=.106, p<.01$). Pretest values significantly predicted posttest values ($\beta=.469, p<.001$). In addition, students receiving All Stars, Sr. reported higher (more desirable) scores on lifestyle incongruence for nutrition than did the comparison students ($\beta=.109, p<.01$).

Lifestyle Incongruence for Stress

Significant effects were observed for lifestyle incongruence for stress ($R^2=.235, F_{(6, 474)}=24.25, p<.001$). Older students reported a greater lack of fit between stress and their desired lifestyles than did younger students ($\beta=.100, p<.03$). Pretest values significantly predicted posttest values ($\beta=.454, p<.001$). Students receiving All Stars, Sr. reported higher scores on lifestyle incongruence for stress than did the comparison students ($\beta=.128, p<.01$).

Normative Beliefs Regarding Drug Use

Normative beliefs regarding drug use were significantly predicted by gender, pretest scores, and treatment group membership ($R^2=.413, F_{(6, 473)}=55.40, p<.001$). Girls scored higher on this mediator than did boys ($\beta=.083, p<.03$). Pretest scores were the strongest predictor of posttest scores ($\beta=.611, p<.001$). After controlling for the effects of demographic variables, students in the treatment condition scored higher on this outcome ($\beta=.067, p=.07$) than did students in the control condition.

Effects of All Stars, Sr. on Behaviors

Logistic regression analyses were conducted to examine whether students who participated in the program differed from comparison students in terms of alcohol, cigarette, and marijuana use. Students' age, gender, and ethnicity were controlled for in these analyses. Interactions between ethnicity and condition were examined to test whether program effects differed by ethnicity.

Drunkennes

Hierarchical logistic regression analyses revealed that ethnicity significantly contributed to the variance accounted for in drunkennes as compared with a model including only pretest drunkennes, gender, and age ($\chi^2(2)=9.49, p<.01$). Interaction terms between the ethnicity variables and condition did not significantly add to the variance accounted for and were not retained in the model. The overall model was significant (likelihood ratio $\chi^2(6)=88.87, p<.001$). Pretest drunkennes was the strongest predictor of posttest drunkennes (odds ratio [OR]=12.67, confidence interval [CI]=6.07–26.39); the ethnicity variable contrasting African-American and White students was also significant (OR=.32, CI=.15–.69), indicating that African-American students were less likely to report 30-day drunkennes at posttest than White students. There was also no statistically significant difference to suggest that students who received All Stars, Sr. were more or less likely to report drunkennes than those who did not (OR=.57, CI=.31–1.05, $p=.07$).



Table 1. Cronbach Alpha Coefficients for Scales Included in the Student Survey

Mediating Variable		No. of Items	Pretest Alpha	Posttest Alpha	Pretest Mean		Posttest Mean	
					Control	Treatment	Control	Treatment
Drugs	Lifestyle Incongruence	5	.701	.772	-.1054	.0547	-.1458	.1024
	Normative Beliefs	6	.782	.779	-.1004	.1311	-.1888	.0339
	Commitment	3	.801	.818	-.0906	.0880	-.1263	.0383
	Resistance Skills	3	.744	.781	-.0556	-.0163	-.0190	.0696
	Beliefs About Consequences	5	.672	.693	-.0766	.0666	-.0860	.0272
Violence	Lifestyle Incongruence	1	—	—	-.0857	-.0526	.0305	.1124
	Normative Beliefs	2	.563	.633	.0207	-.0278	.0818	-.0317
	Commitment	2	.713	.782	-.1006	.0016	.0161	.0573
	Resistance Skills	2	.497	.626	.0742	-.1052	.1316	-.0085
	Beliefs About Consequences	2	.100	.199	-.0370	-.0097	.0662	-.0032
Nutrition	Lifestyle Incongruence	3	.446	.493	-.0682	.0471	-.1113	.0656
	Normative Beliefs	3	.179	.220	-.0078	.0250	-.0300	-.0027
	Commitment	2	.685	.772	.0762	-.0864	.0798	.0019
	Resistance Skills	2	.613	.698	.0029	-.0210	.0541	-.0190
	Beliefs About Consequences	3	.616	.642	-.0306	.0029	-.0493	.0500
Exercise	Lifestyle Incongruence	3	.710	.734	.0451	-.0710	.0554	.0169
	Normative Beliefs	3	.548	.607	-.0204	-.0336	.0297	.0380
	Commitment	2	.735	.748	.0102	-.0167	.0326	-.0121
	Beliefs About Consequences	1	—	—	-.0672	.0681	-.0700	.0105
Stress	Lifestyle Incongruence	3	.617	.721	-.0919	.0315	-.1261	.1103
Bonding to School		5	.791	.759	-.0363	.0203	-.0436	.0271
Goal-Setting Skills		6	.864	.872	-.1375	.0664	-.0905	.0812
Stress Management Skills		4	.796	.778	.00892	-.0539	.0458	.0303

Note. Mean values are for the standardized scale scores.

Cigarette Smoking

The main effect of ethnicity did not significantly contribute to the model predicting cigarette smoking. However, the interaction terms between ethnicity and condition did account for a marginal amount of variance ($\chi^2(2)=4.53, p<.12$) and were therefore kept in the final model. The resulting model was significant (likelihood ratio $\chi^2(8)=91.14, p<.001$). Pretest cigarette use was the largest predictor of posttest use (OR=16.24, CI=8.40–31.39). Gender also significantly predicted posttest use (OR=.50, CI=.28–.90), such that girls

were less likely to smoke than boys. The contrast variables for African-American versus White students were not significant (OR=.31, CI=.09–1.08), indicating that African-American students were as likely to report smoking than White students. Condition also approached significance, indicating that students who received All Stars, Sr. were as likely to smoke at posttest as those who did not (OR=.46, CI=.21–1.0). In addition, the interaction between condition and the contrast variable for African-American/White students approached significance, suggesting that the condition

effect was present for White and African American students (OR=4.51, CI=.99–20.5).

Marijuana Use

The prevalence of marijuana use was very low for this sample (3.5% of comparison and 3.9% of treatment students were continuous users); no program effects were found.

Teacher and Student Perceptions of the Program

Four of the five treatment teachers participated in a focus group. Teachers reported that (1) All Stars, Sr. had been successfully



incorporated into their teaching, (2) the interactive lessons were effective at involving all students, and (3) they intended to use the program in the future. They especially liked the cross-reference system that linked All Stars, Sr. activities with sections of major high school health textbooks. They also preferred shorter activities (i.e., ones that lasted 20 to 30 minutes) due to the competing time demands of teaching and administrative duties.

The greatest concern expressed by teachers was the degree of training and experience needed to implement the activities. Teachers felt that the approach taken by All Stars, Sr. was new and relatively complex. They suggested providing some means of continuous, easy-to-access training, such as a web page or brief videos, that could provide explanations of concepts and demonstrate how activities are to be implemented.

Six focus groups were conducted with groups of 8 to 10 students each. Students enjoyed activities that required active student involvement (e.g., opinion poll game, debates, and role plays) and allowed them to learn about the attitudes and behaviors of their classmates. Students especially enjoyed discussing sensitive topics. They thought that the All Stars, Sr. activities would allow teachers more comfort in initiating discussions of drug use and other sensitive health topics.

Overall, students reported that All Stars, Sr. greatly improved their health class, making it more interesting. One student commented, "Yeah. It was good, because we got to do things and talk about stuff. It was better than reading out of the book and doing worksheets." Suggestions were made to improve the Wellness Journal and several class activities.

DISCUSSION

The results of this preliminary investigation suggest that All Stars, Sr. has significant potential for being an effective drug prevention and general wellness program. A particularly strong finding is that three of the four observed program effects involved the mediator, lifestyle incongruence. Specifically,

program students became increasingly likely to view drug use, poor nutrition, and stress as not fitting with their desired future lives. This variable has been identified (Fearnow-Kenney, Hansen & McNeal, 2002) as a protective factor against alcohol, cigarette, and marijuana use.

Because this is a preliminary evaluation, marginal findings may be important in understanding how the program works. The effect for normative beliefs regarding drug use, although failing to meet the traditional alpha criteria (.05) after controlling for pretest scores and demographic variables, is promising. Results suggest that the intervention has the potential to suppress the perception that peers approve of and use drugs. Correcting erroneous normative beliefs has been shown to have a significant effect on preventing future drug use, delaying the onset of future drug use, and initiating drug use cessation efforts (Hansen & McNeal, 1999; McNeal & Hansen, 1999). Therefore, these are primary goals of the program.

Successful outcomes related to substance use behavior are often difficult to achieve. However, students participating in All Stars, Sr. reported lower posttest rates of cigarette smoking and a trend toward reporting less drunkenness than control students. There was also some indication that the program may be more effective at preventing cigarette use among White students than among African American students. A lower rate of smoking among African American students in this sample may have accounted for the difference. Future research should employ representative samples of ethnic minorities to explore the possibility that the curriculum differentially impacts youth of varied ethnic or cultural backgrounds.

Qualitative data collected from focus group interviews provides further evidence of the program's potential. Teachers reported that the activities were easily implemented in their existing class structure, were successful at engaging all students, and were appropriate for use in future health classes. These factors are important to the adoption and implementation of innova-

tive curricula such as All Stars, Sr. (Goldman, 1994; Paulussen, Kok, Schaalma, & Parcel, 1995).

Student perceptions of All Stars, Sr. were also positive. They enjoyed being given the opportunity to discuss important health topics and learn of the attitudes and behaviors of peers. Interactive lessons such as debates, role plays, and small group projects were enjoyed the most. Students felt that the program made their health class more interesting and effective. Factors such as student engagement and enjoyment of a health-related curriculum have been found to significantly predict student outcomes (Giles, Harrington, & Fearnow-Kenney, 2001). Student engagement in and enjoyment of All Stars, Sr. will serve to increase the program's potential to prevent compromising behaviors and promote healthy ones.

This study had several limitations. First, the findings are based on data collected from students in a suburban part of North Carolina and may not generalize to students of other demographic locations. Second, differential attrition rates for older students and for those reporting past 30-day use of cigarettes and marijuana make conclusions regarding the program's effectiveness with these students difficult to ascertain. Third, more psychometric research on the survey instrument, validity data in particular, is needed. Fourth, better methods of assessing program implementation should be developed. One of the strengths of the curriculum is that teachers can choose to deliver the activities they deem to be most relevant and appropriate for a given class of students. However, this teacher-led approach makes it difficult to determine how implementation (i.e., dosage and quality of delivery) effects outcomes. Future studies will explore this issue. Finally, the study presented here would have been strengthened had multiple posttest occasions been incorporated into the research design.

Notwithstanding the limitations, this preliminary investigation has demonstrated that All Stars, Sr. has potential to serve as an effective supplement to high school health education and high-risk health



behavior prevention. This study identified areas of needed improvement, and subsequently, refinements have been made to the curriculum. In addition, an independent evaluation is currently underway in an attempt to more rigorously assess the potential of the program and hopefully narrow the gap between middle school and high school primary prevention efforts.

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