Published in final edited form as:

Prev Sci. 2012 August ; 13(4): 415–425. doi:10.1007/s11121-011-0269-7.

Preventing Alcohol Use with a Voluntary After School Program for Middle School Students: Results from a Cluster Randomized Controlled Trial of Project CHOICE

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Abstract

There are many mandated school-based programs to prevent adolescent alcohol and drug (AOD) use, but few are voluntary and take place outside of class time.

Objectives—This cluster randomized controlled trial evaluates CHOICE, a voluntary after school program for younger adolescents, which reduced both individual- and school-level alcohol use in a previous pilot study.

Methods—We evaluated CHOICE with 9,528 students from 16 middle schools. The sample was 51% female; 54% Hispanic, 17% Asian, 15% white, 9% multiethnic and 3% African American. Fifteen percent of students attended CHOICE. All students completed surveys on alcohol beliefs and use at baseline and 6–7 months later. We conducted intention-to-treat (ITT) school-level analyses and propensity-matched attendee analyses.

Results—Lifetime alcohol use in the ITT analysis (i.e., school level) achieved statistical significance, with an odds ratio (OR) of 0.70 and a number needed to treat (NNT) of 14.8. The NNT suggests that in a school where PC was offered, 1 adolescent out of 15 was prevented from initiating alcohol use during this time period. Although not statistically significant ($p=.20$), results indicate that past month alcohol use was also lower in PC schools (OR = 0.81; NNT = 45). Comparisons of attendees versus matched controls yielded results for lifetime use similar to school-wide effects (OR = 0.74 and NNT = 17.6).

Conclusions—Initial results are promising and suggest that a voluntary after school program that focuses specifically on AOD may be effective in deterring alcohol use among early adolescents; however, further research is needed as program effects were modest.

Early adolescence is often associated with both initiation and escalation of alcohol use (D'Amico, et al., 2005; Ellickson, McCaffrey, Ghosh-Dastidar, & Longshore, 2003; Faden, 2006). School-based programs are one popular way to reach adolescents as these programs offer parents and adolescents a familiar environment that may be less stigmatizing than being referred to off-site services. This can promote “buy-in” and higher utilization of services in the school setting (Wagner, Tubman, & Gil, 2004). Most prevention programs offered in school settings, for example *Project ALERT* (Ellickson, McCaffrey, et al., 2003) or *keepin’ it R.E.A.L.* (Gosin, Marsiglia, & Hecht, 2003), are offered during class time and take at least 11 weeks to complete, with some programs requiring up to 40 sessions. These programs are typically part of the classroom curriculum and therefore required, with the majority of youth in the school receiving the program.

In contrast to the many mandated in-class programs for adolescent alcohol and drug (AOD) use, there are few voluntary programs available for youth that specifically target AOD, and even fewer that take place outside of class time (Little & Harris, 2003). Voluntary AOD programs may appeal more to youth because they can *choose* to attend sessions that interest them. For example, research has shown that providing youth with a choice can be motivational and increase the chance that they get further help (e.g., Baer, Garrett, Beadnell, Wells, & Peterson, 2007), make changes in their AOD use (D'Amico, Miles, Stern, & Meredith, 2008; Monti, et al., 2007; Spirito, et al., 2004), or remain abstinent (D'Amico & Edelen, 2007). Thus, adolescents who choose to attend AOD programs may be more motivated to utilize the information and make changes in their AOD use or remain abstinent (D'Amico, Osilla, & Stern, in press).

Although after-school programs are a good way to provide resources for youth because they do not require class time or class resources, it can be difficult to reach youth this way. For example, studies have shown that when structured after-school activities are available, youth from lower income families and from ethnic minority backgrounds are less likely to participate in these types of programs (Harvard Family Research Project, 2007). In addition, at-risk youth, such as those who have already initiated AOD use, may also be less likely to access these types of services (Sterling, Weisner, Hinman, & Parthasarathy, 2010; Wu, Hoven, Tiet, Kovalenko, & Wicks, 2002). Thus, after-school programs have to account for potential attendance barriers that would not be an issue in a classroom-based program so that youth from a variety of backgrounds feel comfortable attending the program, and so attendance at the program mirrors classroom composition. Perhaps because of these challenges, voluntary school-based AOD intervention programs are relatively rare.

To date, only three studies have evaluated the effects of a stand-alone AOD intervention that is brief, voluntary, and offered after school. Only one of these programs was tested with middle school youth. The Stay SMART program (St. Pierre, Kaltreider, Mark, & Aikin, 1992) involved high school aged youth who participated in Boys and Girls Clubs. Once youth voluntarily enrolled in the program, they were required to attend 9 of the 12 sessions. Thus, initial involvement was voluntary, but subsequent attendance was mandated. Youth (n=161) who continued participation were mainly male (75%) and ethnical diverse: 45% white, 14% Hispanic, and 42% African American. The youth who continued participation reported less involvement with marijuana compared to a control group (St. Pierre, et al., 1992). The second program involved a voluntary high school intervention targeting AOD self-change efforts (Brown, 2001). Participants were 45% female and mainly white (61%). Results based on a one-semester follow-up indicated that the heaviest drinking students who attended at least one session reported more attempts to cut down or quit drinking than non-attending heavy drinking adolescents. Results were not reported for actual rates of drinking (Brown, Anderson, Schulte, Sintov, & Frissell, 2005).

The third program, CHOICE, focused on middle school youth. CHOICE includes components utilized in other successful programs, such as enhancing protective factors and reducing risk factors (e.g., Henggeler, 1998; Morehouse and Tobler, 2000; Sussman et al., 1995), targeting multiple substances (e.g., D'Amico and Fromme, 2002; Ellickson et al., 2003b; Sussman et al., 2002), utilizing interactive techniques that allow active involvement in learning about problems from substance use, such as discussion of normative feedback or engaging in role plays (D'Amico & Fromme, 2002; Ellickson, McCaffrey, et al., 2003; Hansen & Graham, 1991), reinforcing skills (Botvin, 2000; Brown, 2001), and providing information in a nonjudgmental and nonconfrontational manner (Barnett, Monti, & Wood, 2001; Borsari & Carey, 2000). A pilot evaluation of CHOICE in one school showed that youth who participated in CHOICE were racially/ethnically diverse (D'Amico, et al., 2005). When CHOICE was compared to a control school, the program was associated with both

individual- and school-level reductions in alcohol use (D'Amico & Edelen, 2007). In addition, a recent paper (Kilmer, Burgdorf, D'Amico, Tucker, & Miles, 2011) found that the per participant cost for CHOICE (based on average labor and space costs for the country) was lower than SAMHSA's estimate for the "average effective school-based program" (SAMHSA, 2009).

The current study builds on the smaller pilot evaluation of CHOICE by evaluating this program in a large cluster-randomized controlled trial of 16 schools. A cluster randomized trial was employed because the intervention was offered at the school level. We focus on alcohol use in this paper because alcohol is the most frequently used substance in middle school (D'Amico & Edelen, 2007; Ellickson, McCaffrey, et al., 2003; Johnston, O'Malley, Bachman, & Schulenberg, 2011), particularly with younger students in 6th and 7th grade, and we would not have power to detect changes in other substances in this one year time period. Our primary outcome of interest was initiation of alcohol use and past month use of alcohol. Our secondary outcomes of interests were beliefs related to alcohol, such as intentions to drink and resistance self-efficacy. We hypothesized that the program would have two types of effects on alcohol use and alcohol beliefs based on our results from the smaller pilot study: first, we expected an effect of program availability, which we determined by examining differences between treatment and control schools (an intention-to-treat analysis); second, we expected an effect of program participation, which we determined by examining differences between attenders and propensity-matched controls (a treatment-received analysis).

Methods

Participants and Procedure

Sixth, seventh and eighth grade students in 16 middle schools across three school districts in southern California were recruited for the current study, which involved surveys and a voluntary after school program, CHOICE, that targeted substance use. Schools were selected and matched to their nearest neighbor school based on the squared Euclidean distance measure, estimated using publicly available information on ethnic diversity, approximate size and standardized test scores. One school of each pair was then randomized to intervention or control conditions using the MS Excel random number generator. JM, the third author, was responsible for matching and allocation of schools and had no direct contact with or knowledge of the schools other than the characteristics used for matching. Active parental permission was required for the survey and CHOICE. A total of 14,979 students across all sixteen schools received parental consent forms to participate in the study with approximately 7,271 students in the 8 control schools and 7,708 students in the 8 intervention schools; 92% of parents returned this form ($n = 13,785$). Approximately 71% of parents gave permission for their child to participate in the study ($n = 9,828$). Ninety-four percent of consented students completed the baseline survey ($n = 8932$; mean age = 12.6) and 89% completed the follow-up survey ($n = 8522$), which is higher or comparable to other school-based survey completion rates with this population (Johnson & Hoffmann, 2000; Johnston, O'Malley, Bachman, & Schulenberg, 2009; Kandel, Kiros, Schaffran, & Hu, 2004). There were no statistically significant differences in follow-up rates (intervention schools: 88.8%, control schools: 87.8%; $p=0.59$). The overall sample was ethnically diverse and comparable to the ethnic composition of the relevant school populations based on published demographic information for the schools. Rates of lifetime and past month substance use in our baseline sample of 7th and 8th graders were also comparable to national samples (SAMHSA, 2008). For example, in the 2007 National Survey on Drug Use and Health (SAMHSA, 2008), 28.2% of eighth graders reported lifetime alcohol use, compared with 29.2% in our sample of 8th graders. Finally, our matching of the intervention and

control schools shows that the demographic information was similar; a slightly higher proportion of survey completers in control schools were 8th graders (see Table 1).

Surveys—Baseline surveys were completed between late September and early October of 2008, with follow up surveys completed between late May and early June 2009. Surveys were administered on a pre-scheduled day during Physical Education (PE) class and took 45 minutes to complete. Trained staff described the survey to students, reviewed confidentiality, and answered questions. Spanish speaking staff members were available to answer student questions; survey booklets were available in Spanish and Korean¹. We used the Magnus method to translate our measures in which one individual translated the measure from English to Spanish/Korean. A second individual who had not seen the English version translated the Spanish/Korean version to English. The two English versions were then compared to each other and differences reconciled through deliberation by the two individuals. Survey responses are protected by a Certificate of Confidentiality from the National Institutes of Health. All materials and procedures are approved by the school districts, individual schools, and the institution's Internal Review Board.

Project CHOICE—Eight schools were randomly assigned to receive CHOICE. CHOICE was delivered once per week after school on a set day when teens with permission could choose to attend. CHOICE consists of five distinct 30-minute sessions that rotate throughout the entire school year. The program is based on Social Learning Theory (Bandura, 1977), Decision-Making Theory (Kahneman & Tversky, 2000) and Self-Efficacy Theory (Bandura, 1997). For example, Social Learning Theory suggests that people make assumptions about their environment based on their perceptions of the behavior and attitudes of others (Bandura, 1986; Maisto, Carey, & Bradizza, 1999); however, these assumptions may not be accurate and may increase risk behavior. In fact, most teens overestimate the number of peers who drink, smoke cigarettes, or use marijuana, which can increase use of these substances (e.g., D'Amico & Fromme, 2002; Ellickson, Bird, Orlando, Klein, & McCaffrey, 2003; McNeal, Hansen, Harrington, & Giles, 2004). The CHOICE curriculum therefore provides normative information based on Monitoring the Future statistics (Johnston, et al., 2009), an approach which has been used successfully in several interventions with adolescents (Brown, et al., 2005; D'Amico & Fromme, 2002; Ellickson, McCaffrey, et al., 2003; Graham, Marks, & Hansen, 1991; Hansen & Graham, 1991). CHOICE also used a motivational interviewing (MI) approach (Miller & Rollnick, 2002; Rollnick, Miller, & Butler, 2008) to present the program curriculum. CHOICE was pilot tested with approximately 500 students to obtain feedback on the style and content of the program to ensure the program was developmentally relevant for this age group so that youth would choose to attend the program voluntarily. A thorough description of CHOICE is published elsewhere (D'Amico, et al., 2005). Briefly, sessions focus on providing normative feedback on alcohol and marijuana use among middle-school aged youth, challenging unrealistic beliefs about substances, resisting pressure to use substances through the use of role play, discussing potential benefits of both cutting down and stopping use and discussing risky situations and coping strategies (e.g., getting social support, learning how to avoid certain high-risk situations).

Facilitators advertised CHOICE through flyers and brief class presentations. When additional recruitment was needed, they promoted the program during lunch periods by providing information about the program and involving the students in games that offered small promotional items as prizes (e.g., a pencil that said "CHOICE"). Students could choose to attend as many of the five sessions as they wanted. Similar to other after schools

¹Approximately 3–5% of students used the Spanish survey version and less than 1% of students used the Korean survey version.

programs (e.g., Ferrari, Lekies, & Arnett, 2009; Little, Wimer, & Weiss, 2008), youth who attended the program received a snack at each session. At the eight intervention schools, 15% ($n = 703$) of consented students voluntarily attended CHOICE during the year. The mean number of sessions attended was 3.0 ($SD = 1.76$). One-third of participants attended all five sessions and received a \$5 gift certificate for completing all five sessions. There were some differences between CHOICE participants and non-participants in this larger trial. For example, African American and multiethnic students were more likely to attend. In addition, past month alcohol users were more likely to initially attend, and marijuana users were more likely to continue attendance (D'Amico, et al., in press).

CHOICE facilitators were eight Bachelor- and Masters-level project staff not affiliated with the schools. The first author (ED), a licensed clinical psychologist, was the lead study trainer. ED is also part of the Motivational Interviewing Network of Trainers (MINT). Training for the current study consisted of a workshop on MI and group and individual practice for each of the five sessions, with a total of approximately 30 hours of training for each of the facilitators over a four week period. To ensure fidelity of intervention delivery after training, facilitators were supervised weekly. In addition, trained observers watched each facilitator provide two different sessions over the year and coded them on adherence to MI and fidelity to the protocol.

Study Measures

Socio-demographic Characteristics

Socio-demographic covariates included age, gender, race/ethnicity, parental education, and current living situation (e.g., living with two parents, one parent, other relatives).

Alcohol Use

Lifetime and past month frequency of alcohol use were assessed with well-established measures from the California Healthy Kids Survey (WestEd, 2008), Monitoring the Future (Johnston, et al., 2009), and Project ALERT (Ellickson, McCaffrey, et al., 2003). Frequency of consumption was assessed by asking "During your life [or past month], how many times [or days] have you tried alcohol?" Respondents were also queried about heavy drinking in the past month by asking how frequently they had drunk "five or more drinks of alcohol in a row, that is, within a couple of hours." A "drink" was defined as one whole drink of alcohol (not including a few sips of wine for religious purposes). Responses to the three alcohol items were dichotomized to indicate whether the student had engaged in any lifetime drinking, any past month drinking and any past month heavy drinking. The school level intraclass correlations (ICCs) for these measures at follow-up were 0.02 for lifetime alcohol consumption, 0.01 for past month alcohol consumption and 0.01 for heavy drinking.

Beliefs about alcohol

Intention to drink in the next six months was assessed with a single item rated on a 4-point Likert scale from 1 (definitely no) to 4 (definitely yes; $ICC = 0.01$.)

Resistance self-efficacy (RSE) was assessed using scales developed in Project ALERT (Ellickson, McCaffrey, et al., 2003). Students were asked: "Suppose you are offered alcohol and you do not want to use it. What would you do in these situations: A) your best friend is drinking alcohol; B) you are bored at a party; and C) all your friends at a party are drinking alcohol?" These three items were rated on a scale ranging from 1 = "I would definitely drink" to 4 = "I would definitely not drink" and scores were averaged to develop a single RSE scale ($\alpha = 0.93$). Higher scores indicated higher resistance self-efficacy ($ICC =$

0.02). The mean resistant self-efficacy score in control schools was 3.57 (95% CIs 3.42, 3.63) and in intervention schools it was 3.63 (95% CIs 3.50, 3.76).

Perceived alcohol use among peers at school (WestEd, 2008) was measured by asking students to estimate how many students in their grade out of 100 (or approximately 3 classrooms of students) drink alcohol at least once a month. Responses were recorded on an 11-point scale where zero or no students out of 100 was coded as “1”, 10 students out of 100 was coded as “2”, and so forth (ICC = 0.02). The mean perceived alcohol use in control schools was 1.98 (95% CIs 1.63, 3.22) and in intervention schools it was 1.76 (95% CIs 1.44, 2.08).

Fidelity and acceptability measures

We used the Motivational Interviewing Treatment Integrity scale (MITI 3.1) (Moyers, Martin, Manuel, Miller, & Ernst, 2010) to measure MI adherence. The MITI comprises both global scores and behavioral counts to assess overall adherence. CHOICE attendees were invited to complete a short, anonymous questionnaire at the end of each session that assessed satisfaction with the session (1=not at all to 5=completely).

Analysis Plan

Data that are not missing completely at random are likely to cause bias in parameter estimates (Allison, 2001). Data were cleaned and logical imputation was carried out to ensure consistency. We used a multiple imputation approach using a sequence of regression models to ensure that parameters were unbiased in the presence of data missing at random (Schafer, 1999; Schafer & Graham, 2002). We used the IVEware software package (Raghunathan, Solenberger, & van Hoewyk, 2002). This package uses a multiple imputation approach similar to SAS PROC MI, but IVEware also allows for the incorporation of clustered data (at the school level) in the imputation process. Thus, we imputed and analyzed 30 data sets separated by 10 iterations (sufficient to achieve stable results). Imputations were carried out separately for males and females and for intervention and control groups (Allison, 2001). Where appropriate, we treated variables as categorical for the purposes of imputation. These 30 imputed datasets were analyzed separately, and results were combined following the formulae provided by Little and Rubin (1987) and implemented in the SAS 9.2 (SAS Institute, 2008) MIAnalyze procedure. This approach gives unbiased results when the data are missing at random or missing completely at random (Schafer & Graham, 2002). We imputed all variables with missing values, with the exception of age, gender and race/ethnicity.

Data were analyzed using two approaches. First, we used an intention-to-treat approach (ITT) in which adolescents were analyzed in the groups to which they were assigned; that is, all respondents in control schools were compared to all respondents in intervention schools, regardless of attendance at CHOICE. Second, we used a propensity matching approach, using twang (Techniques for Weighting and Analysis of Non-equivalent Groups; Ridgeway, McCaffrey, & Morral, 2006) to create a sample of individuals from control schools equivalent to those in intervention schools (so-called Average Treatment for the Treated or ATT weights). twang is a package for the R statistical programming environment (R Development Core Team, 2009) that uses boosted regression to calculate sample weights which balance the two groups on predictors. It is one of the most efficient and valid propensity methods to use with this type of data set (Harder, Stuart, & Anthony, 2010). Fifty-six variables were incorporated as potential covariates for balance (e.g., age, gender, grade, academic performance, parental education, past year and past month substance use). We estimated effects of the intervention for “attenders” versus propensity matched controls.

For continuous and dichotomous outcome variables we used generalized estimating equation (GEE) regression models to account for the clustering of individuals within schools. For the ITT analyses, we estimated unadjusted outcomes in a bivariate analysis without baseline covariates, and we also estimated the outcomes in an adjusted multivariate analysis in which we included the following covariates: baseline level of the variable and current school grade, sex and race.

We calculated effect sizes based on parameter estimates from the regressions; we used the pooled standard deviation at baseline to calculate Cohen's *d* for continuous measures and the control group probability of behavior to calculate the number needed to treat (NNT) for dichotomous measures. To explore the effect of attendance at CHOICE, we regressed outcomes against the number of sessions attended, incorporated the same covariates as in the previous analysis and included school as a fixed effect.

Results

Fidelity and Acceptability of Project CHOICE

The mean spirit rating on the MITI across all facilitators was 4 (competent) and MI adherence averaged 93%. Adherence to protocol content across sessions was 90% (*SD* = 10%). Satisfaction scores were high (1=completely satisfied, 5= not at all satisfied), indicating that students liked the style of the meeting ($\bar{M}$ = 1.3), thought the facilitator was helpful ($\bar{M}$ = 1.2) and thought the discussion was helpful ($\bar{M}$ = 1.3).

Reliability Checks

We examined the data for inconsistent responses. Of those individuals who said that they had not consumed alcohol in the past month at wave 1, 0.3% said that they had engaged in heavy drinking in the past month; at wave 2, the value was 0.4%. Similarly, of those who said that they had not consumed alcohol in their lifetime, 1.6% said that they had consumed alcohol in the past month at wave 1, and 1.1% said that they had consumed in the past month at wave 2. Thus, our reliability checks show that the proportion of inconsistent responses was very low.

Effects of Project Choice

Descriptive statistics for outcome variables are based on the imputed and combined datasets (Table 2). After controlling for the grade difference, there were no significant baseline differences on the measured variables between intervention and control schools. Attenders were matched to controls through propensity weighting, which eliminated differences in covariates.

From baseline to follow up, consumption and intention measures all increased (as expected of this age group); however, rates of consumption were lower among CHOICE attenders compared to a matched sample of controls after accounting for covariates. In particular, lifetime alcohol use increased to 28% among weighted controls, whereas the increase was only to 23% in the attender group. Examination of school-wide effects indicated that rates of consumption and intentions to use alcohol were also significantly lower in CHOICE schools compared to control schools.

Overall, results were substantively equivalent regardless of adjustment for covariates in the ITT analysis, thus we report results for which the covariates were adjusted. Results from the regression models (Table 3) show that most effects are in the predicted direction, with the exception of perceived alcohol use, which is 0.03 units higher (on an 11-point scale) in the intervention group. Lifetime alcohol use in the ITT analysis (i.e., at the school level)

achieved statistical significance, with an odds ratio (OR) of 0.70 and a number needed to treat (NNT) of 14.8. The NNT suggests that in a school where CHOICE was offered, 1 adolescent out of 15 was prevented from initiating alcohol use during this time period. Although not statistically significant ($p=.20$), results indicate that past month alcohol use was also lower in CHOICE schools (OR = 0.81; NNT = 45). Comparisons of attenders versus matched controls yielded results for lifetime use similar to school-wide effects (OR = 0.74 and NNT = 17.6), as shown in the bottom of Table 2. This difference did not reach statistical significance at the conventional $p=0.05$ level given the reduced sample size for this analysis and the resulting larger standard errors. Statistically significant differences were not found for intentions, perceived alcohol prevalence or RSE at the individual- or school-level.

To explore the effects of CHOICE attendance further, we investigated the association between the number of CHOICE sessions individuals attended and lifetime, past month and heavy drinking, intentions to drink, perceived prevalence and RSE, controlling for covariates as in the prior models. Controlling for baseline levels, youth who attended a greater number of CHOICE sessions also reported higher resistance self-efficacy at follow-up ($p<.05$). No other effects reached a statistically significant magnitude (at the 0.05 level).

Discussion

This cluster randomized trial of a voluntary alcohol and drug prevention program for middle school youth replicates school-level results found in a pilot trial of CHOICE. We found a school-wide effect on alcohol use for all students at the intervention schools, whether or not they attended CHOICE. Specifically, students at the eight schools who received the CHOICE program were less likely to initiate alcohol use during the academic year compared to students at the eight control schools. In addition, although not statistically significant (possibly due to smaller sample sizes), there was a trend for individuals who attended CHOICE to be less likely to initiate and drink alcohol in the past month compared to a matched control group that did not attend CHOICE. The odds ratio (OR=0.74) and number needed to treat (NNT=17.6) for these individual-level analyses were comparable to those found for school-wide effects (OR=0.70, NNT=14.8), which emphasizes the clinical significance of both the school-level and individual-level findings. That is, only 15–18 people would need to be exposed to this brief, voluntary 30-minute program to see benefits for one individual. In terms of facilitator time for the benefit obtained, this appears to be an efficient and promising approach to reduce alcohol use among youth; however, further research is needed as effects were modest.

Program effectiveness is dependent upon the fidelity of implementation (Wagner, et al., 2004). Findings from the trained observers indicate that facilitators adhered to the CHOICE protocol and consistently used MI during the session. Thus, across all eight schools, facilitators discussed the same content and also provided content to students using motivational interviewing. In addition, student reports indicated that they liked the style of the meeting and that the facilitator and information were helpful.

In contrast to other after-school programs, this voluntary after-school program reached a diverse and at-risk population of youth (D'Amico, et al., in press) who typically do not obtain services (Harvard Family Research Project, 2007; Sterling, et al., 2010; Wu, et al., 2002). In addition, given funding cuts and the limited resources available to schools, CHOICE is an attractive alternative to providing programming to youth in the school setting as the per participant cost of CHOICE is less expensive than many other school-based prevention programs (Kilmer, Burgdorf, D'Amico, Tucker, & Miles, 2011). Thus, this

program can offer some significant benefits over other prevention programs for this age group.

A 2009 report from the Afterschool Alliance on a nationally representative sample of youth found that 15% of youth attend after school programs, which includes programs focused on academics, sports, mentoring, etc. (Afterschool Alliance, 2009). In the only other study reporting on a voluntary after school program for middle school youth that actually focused on alcohol and drug use, *but* was also part of a more comprehensive after school program that included tutoring, academics, and leisure activities, participation averaged 14.5% across five different schools (Gottfredson, Cross, Wilson, Rorie, & Connell, 2010). Thus, the participation rate for CHOICE is the same as other after school programs, which tend to address a variety of behaviors. Furthermore, a 2006 review of the effects of after school programs on student outcomes (Zief, Lauver, & Maynard, 2006) found that only 20% of after school programs targeted middle school youth. Therefore, the current study addresses an important prevention and intervention gap by focusing on this population.

Despite the effects of CHOICE on alcohol use, we did not find individual- or school-level changes in RSE, perceived prevalence of drinking, or intentions to drink. One exception involved the dosage of the intervention: individuals who attended more sessions of CHOICE reported increases in resistance self-efficacy for alcohol, suggesting that students may need to attend more sessions so that they can practice these skills several times and feel confident in using them. It is interesting to note that results from substance use intervention studies examining whether changes occur in these types of mediating variables have been mixed. Some intervention studies report changes in both the hypothesized mediating variables and substance use (D'Amico, et al., 2008; Kelly & Lapworth, 2006; Neighbors, et al., 2010; Orlando, Ellickson, McCaffrey, & Longshore, 2005). Other studies report changes in substance use in the absence of changes in the hypothesized mediating variables (Agostinelli & Grube, 2005; Colby, et al., 2005; Peterson, Baer, Wells, Ginzler, & Garrett, 2006), similar to the present study. Still other studies only report on substance use outcomes and do not discuss potential mediating mechanisms (Baer, et al., 2007; Hollis, et al., 2005; Horn, Dino, Hamilton, & Noerachmanto, 2007; Mason & Posner, 2009; McCambridge, Slym, & Strang, 2008). Jones and colleagues reviewed this issue for one mediator, alcohol beliefs, by examining interventions that targeted both alcohol beliefs and drinking behavior. They concluded from these studies that there was no evidence that changing beliefs was an effective means of changing drinking (Jones, Corbin, & Fromme, 2001a; Jones, Corbin, & Fromme, 2001b). Thus, while we cannot draw conclusions from this study about the mechanisms through which CHOICE has an effect on alcohol use among middle school students, the absence of mediating effects for alcohol-related beliefs is certainly not without precedence in the literature.

Schools are increasingly faced with challenges that limit their ability to provide prevention and intervention services. They often lack resources (e.g., tools or funding) or capacity (e.g., knowledge, attitudes, skills) to adapt and implement strategies that have been developed in resource-intensive research settings (D'Amico, Chinman, Stern, & Wandersman, 2009). Many schools are currently operating in an environment of budget cuts and increased teacher workload, combined with pressures to complete more intensive mandated curricula and obtain high test scores. These factors can challenge a school's ability to provide alcohol and drug prevention programming and to implement programming as it was intended (D'Amico, et al., 2009). Thus, there is often a large gap between research and practice (Green, 2001; Wandersman & Florin, 2003). Building CHOICE with community input and collaborating on program development decreased this gap, creating an inexpensive, easily implemented, and accessible program. In addition, this larger trial replicates the pilot study of CHOICE and demonstrates that 1) adolescents *will* voluntarily attend an after school program that

specifically provides information on AOD, and 2) this type of programming *can reduce* alcohol use at the school level. This study is the next step in understanding how voluntary after-school AOD programs may positively affect adolescent AOD use; further research is needed in this area to continue to move the field forward.

As with most research of this nature, we relied on self-report from adolescents, the limitations of which are well-known, although possibly exaggerated (Chan, 2008). In fact, much research has shown that self-report among youth is valid when procedures, such as those used in the current study are implemented, for example, discussing confidentiality, using Scantron forms for survey answers and having study staff not affiliated with the school collect information (D'Amico & McCarthy, 2006; Dennis, et al., 2002; Shillington & Clapp, 2000).

Although our effect sizes suggest that CHOICE attendees had clinically meaningful decreases in initiation and past month alcohol use, higher attendance at CHOICE would have allowed us a greater chance of detecting statistically significant effects among the individual participants. In addition, although our sample size is large, the power of the study to detect effects is not as large as it appears due to the use of cluster randomization. For example, the effective sample size for a sample of 9,000 for an outcome with an ICC of 0.02 is 801 (Murray, 1998), giving an effective sample size of approximately 400 per group. When considering attenders only, this effective sample size is reduced further. Thus, although the results of the study for several outcome measures failed to achieve statistical significance at the 0.05 level, this should not necessarily be taken as evidence of the ineffectiveness of this intervention. This drawback can be avoided through the use of individual randomization; however, such an approach is not feasible if the aim is to examine school level effects. In addition, CHOICE involved a number of components utilized in other successful prevention and intervention approaches (e.g., normative feedback, skills training). Further research could dismantle these different components to determine if certain features were associated with greater change compared to others.

Despite limitations, results emphasize that if prevention researchers build a program with developmentally relevant content and provide this content in an engaging and non-judgmental way, we can reach many adolescents who will voluntarily access this information. This is key as voluntary after school programs must be delivered in a way that holds adolescents' interest or they will not attend regularly (Gottfredson, et al., 2010). After school programs can benefit youth by encouraging positive social development and better school behavior (Durlak & Weissberg, 2007; Lauver, Little, & Weiss, 2004). This cluster randomized trial demonstrates that structured, voluntary after school programs that specifically focus on AOD can also be an effective way to reach a diverse group of youth and potentially decrease alcohol use during this important developmental period.

Acknowledgments

Work on this article was supported by a grant from the National Institute of Alcohol Abuse and Alcoholism (R01AA016577) to Elizabeth D'Amico. The authors wish to thank the districts and schools who participated and supported this project. We would also like to thank Kirsten Becker and Megan Zander-Cotugno for overseeing the survey administrations at the 16 schools. We thank the eight facilitators for implementing Project CHOICE in the schools (Dionne Barnes, Erin dela Cruz, Blanca Dominguez, Mary Lou Gilbert, Marcia Gillis, Robert Reaugh, Jimmy Rodriguez and Stefanie Stern) and we thank Karen Osilla, Jennifer Parker and Qiana Montazeri for their help with coding adherence and MI of the CHOICE sessions. Finally, we thank Michael Woodward for his help and creativity in developing the CHOICE logo and our project materials.

References

- Afterschool Alliance. American after 3pm: The most in-depth study of how America's children spend their afternoons. 2009 Retrieved from http://www.afterschoolalliance.org/AA3_Full_Report.pdf.
- Agostinelli G, Grube J. Effects of presenting heavy drinking norms on adolescents' prevalence estimates, evaluative judgments, and perceived standards. *Prevention Science*. 2005; 6(2):89–99. [PubMed: 15889624]
- Allison, PD. Missing Data. (Vol. 07–136). Thousand Oaks, CA: Sage University Papers; 2001.
- Baer JS, Garrett SB, Beadnell B, Wells EA, Peterson PL. Brief motivational intervention with homeless adolescents: Evaluating effects on substance use and service utilization. *Psychology of Addictive Behaviors*. 2007; 21:582–586. [PubMed: 18072842]
- Bandura, A. Social learning theory. Englewood Cliffs, NJ: Prentice Hall; 1977.
- Bandura, A. Social foundations of thought and action: A social cognitive theory. Saddle River, NJ: Prentice-Hall, Inc.; 1986.
- Bandura, A. Self-efficacy: The exercise of control. New York, NY: Freeman; 1997.
- Barnett, NP.; Monti, PM.; Wood, MD. Motivational interviewing for alcohol-involved adolescents in the emergency room. In: Wagner, EF.; Waldron, HB., editors. Innovations in adolescent substance abuse interventions. Amsterdam, Netherlands: Pergamon/Elsevier Science Inc.; 2001. p. 143–168.
- Borsari B, Carey KB. Effects of a brief motivational intervention with college student drinkers. *Journal of Consulting and Clinical Psychology*. 2000; 68(4):728–733. [PubMed: 10965648]
- Brown RA, Ramsey SE, Strong DR, Myers MG, Kahler CW, Lejuez CW, et al. Effects of motivational interviewing on smoking cessation in adolescents with psychiatric disorders. *Tobacco Control*. 2003; 12(Suppl 4):IV3–IV10. [PubMed: 14645934]
- Brown, SA. Facilitating change for adolescent alcohol problems: A multiple options approach. In: Wagner, EF.; Waldron, HB., editors. Innovations in adolescent substance abuse intervention. Oxford: Elsevier Science; 2001. p. 169–187.
- Brown SA, Anderson K, Schulte MT, Sintov ND, Frissell KC. Facilitating youth self-change through school-based intervention. *Addictive Behaviors*. 2005; 30:1797–1810. [PubMed: 16111834]
- Chan, D. So why ask me? Are self-report data really that bad?. In: Lance, CE.; Vandenberg, RJ., editors. Statistical and methodological myths and urban legends: Doctrine, verity and fable in the organizational and social sciences. New York: Psychology Press; 2008. p. 309–336.
- Colby SM, Monti PM, Tevyaw TO, Barnett NP, Spirito A, Rohsenow DJ, et al. Brief motivational intervention for adolescent smokers in medical settings. *Addictive Behaviors*. 2005; 30:865–874. [PubMed: 15893085]
- D'Amico, EJ.; Chinman, M.; Stern, A.; Wandersman, A. Community prevention handbook on adolescent substance abuse prevention and treatment. In: Leukefeld, C.; Gullotta, T.; Tindall, MS., editors. Adolescent substance abuse: Evidence-based approaches to prevention and treatment. New York, NY: Springer Science + Business Media; 2009. p. 73–96.
- D'Amico EJ, Edelen M. Pilot test of Project CHOICE: A voluntary after school intervention for middle school youth. *Psychology of Addictive Behaviors*. 2007; 21(4):592–598. [PubMed: 18072844]
- D'Amico EJ, Ellickson PL, Wagner EF, Turrise R, Fromme K, Ghosh-Dastidar B, et al. Developmental considerations for substance use interventions from middle school through college. *Alcoholism: Clinical and Experimental Research*. 2005; 29:474–483.
- D'Amico EJ, Fromme K. Brief prevention for adolescent risk-taking behavior. *Addiction*. 2002; 97:563–574. [PubMed: 12033657]
- D'Amico EJ, Green HDJ, Miles JNV, Zhou AJ, Tucker JA, Shih RA. Voluntary after school alcohol and drug programs: If you build it right, they will come. *Journal of Research on Adolescence*. in press.
- D'Amico EJ, McCarthy DM. Escalation and initiation of younger adolescents' substance use: the impact of perceived peer use. *Journal of Adolescent Health*. 2006; 39(4):481–487. [PubMed: 16982381]
- D'Amico EJ, Miles JNV, Stern SA, Meredith LS. Brief motivational interviewing for teens at risk of substance use consequences: A randomized pilot study in a primary care clinic. *Journal of Substance Abuse Treatment*. 2008; 35:53–61. [PubMed: 18037603]

- D'Amico, EJ.; Osilla, KC.; Stern, SA. Prevention and intervention in the school setting. In: Sher, KJ., editor. *The Oxford Handbook of Substance Use Disorders*. New York: Oxford University Press; (in press)
- Dennis M, Titus JC, Diamond G, Donaldson J, Godley SH, Tims FM, et al. The Cannabis Youth Treatment (CYT) experiment: rationale, study design and analysis plans. *Addiction*. 2002; 97(Suppl 1):16–34. [PubMed: 12460126]
- Durlak, JA.; Weissberg, RP. The impact of after-school programs that promote personal and social skills. Chicago, IL: Collaborative for Academic, Social, and Emotional Learning; 2007.
- Ellickson PL, Bird CE, Orlando M, Klein DJ, McCaffrey DF. Social context and adolescent health behavior: Does school-level smoking prevalence affect students' subsequent smoking behavior? *Journal of Health and Social Behavior*. 2003; 44:525–535. [PubMed: 15038147]
- Ellickson PL, McCaffrey DF, Ghosh-Dastidar B, Longshore DL. New inroads in preventing adolescent drug use: Results from a large-scale trial of project ALERT in middle schools. *American Journal of Public Health*. 2003; 93:1830–1836. [PubMed: 14600049]
- Faden VB. Trends in initiation of alcohol use in the United States 1975 to 2003. *Alcoholism: Clinical and Experimental Research*. 2006; 30:1011–1022.
- Ferrari TM, Lekies KS, Arnett N. Opportunities matter: Exploring Youth's Perspectives on Their Long-Term Participation in an Urban 4-H Youth Development Program. *Journal of Youth Development*. 2009; 4(3):1–19.
- Gosin M, Marsiglia FF, Hecht ML. keepin' it R.E.A.L.: A drug resistance curriculum tailored to the strengths and needs of pre-adolescents of the southwest. *Journal of Drug Education*. 2003; 33:119–142. [PubMed: 12929705]
- Gottfredson DC, Cross AB, Wilson DM, Rorie M, Connell N. Effects of participation in after-school programs for middle school students: A randomized trial. *Journal of Research on Educational Effectiveness*. 2010; 3:282–313.
- Graham JW, Marks G, Hansen WB. Social influence processes affecting adolescent substance use. *Journal of Applied Psychology*. 1991; 76:291–298. [PubMed: 2055870]
- Green LW. From research to "best practices" in other settings and populations. *American Journal of Health Behavior*. 2001; 25(3):165–178. [PubMed: 11322614]
- Hansen WB, Graham JW. Preventing alcohol, marijuana, and cigarette use among adolescents: Peer pressure resistance training versus establishing conservative norms. *Preventive Medicine*. 1991; 20:414–430. [PubMed: 1862062]
- Harder VS, Stuart EA, Anthony JC. Propensity score techniques and the assessment of measured covariate balance to test causal associations in psychological research. *Psychological Methods*. 2010; 15:234–249. [PubMed: 20822250]
- Harvard Family Research Project. Findings from HFRP's study of predictors of participation in out-of-school time activities: Fact sheet. Cambridge, MA: Harvard Graduate School of Education; 2007.
- Hollis JF, Polen MR, Whitlock EP, Lichtenstein E, Mullooly JP, Velicer WF, et al. Teen reach: Outcomes from a randomized, controlled trial of a tobacco reduction program for teens seen in primary medical care. *Pediatrics*. 2005; 115(4):981–989. [PubMed: 15805374]
- Horn K, Dino G, Hamilton C, Noerachmanto N. Efficacy of an emergency department-based motivational teenage smoking intervention. *Preventing Chronic Disease*. 2007; 4(1):A08. [PubMed: 17173716]
- Johnson RA, Hoffmann JP. Adolescent cigarette smoking in U.S. racial/ethnic subgroups: findings from the National Education Longitudinal Study. *Journal of Health and Social Behavior*. 2000; 41:392–407. [PubMed: 11198564]
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Volume I: Secondary school students. Bethesda, MD: National Institute on Drug Abuse; 2009. Monitoring the Future national survey results on drug use, 1975–2008.
- Johnston, LD.; O'Malley, PM.; Bachman, JG.; Schulenberg, JE. Volume I: Secondary school students. Ann Arbor, Michigan: Institute for Social Research, The University of Michigan; 2011. Monitoring the Future national survey results on drug use, 1975–2010.
- Jones B, Corbin W, Fromme K. A review of expectancy theory and alcohol consumption. *Addiction*. 2001a; 16:57–72.

- Jones BT, Corbin W, Fromme K. Half full or half empty, the glass still does not satisfactorily quench the thirst for knowledge on alcohol expectancies as a mechanism of change. *Addiction*. 2001b; 96:1672–1674.
- Kahneman, D.; Tversky, A. Choices, values, and frames. New York: Cambridge University Press; 2000.
- Kandel DB, Kiros GE, Schaffran C, Hu MC. Racial/ethnic differences in cigarette smoking initiation and progression to daily smoking: A multilevel analysis. *American Journal of Public Health*. 2004; 94:128–135. [PubMed: 14713710]
- Kelly AB, Lapworth K. The HYP program--Targeted motivational interviewing for adolescent violations of school tobacco policy. *Preventive Medicine*. 2006; 43:466–471. [PubMed: 16920183]
- Kilmer B, Burgdorf J, D'Amico EJ, Tucker JS, Miles JNV. A multi-site cost analysis of a school-based voluntary alcohol and drug prevention program. *Journal of Studies on Alcohol and Drugs*. 2011; 72(5):823–832. [PubMed: 21906509]
- Lauver, S.; Little, PMD.; Weiss, H. Moving beyond the barriers: Attracting and sustaining youth participation in out-of-school time programs. In: Harvard Family Research Project. , editor. Issues and opportunities in out-of-school time evaluation. Vol. Vol. 6. Cambridge: Harvard Graduate School of Education; 2004. p. 1-16.
- Little, PMD.; Harris, E. A review of out-of-school time program quasi-experimental and experimental evaluation results. In: Harvard Family Research Project. , editor. Out-of school time evaluation snapshot. Vol. Vol. 1. Cambridge: Harvard Graduate School of Education; 2003. p. 1-12.
- Little, PMD.; Wimer, C.; Weiss, HB. After school programs in the 21st century: Their potential and what it takes to achieve it. In: Harvard Family Research Project. , editor. Issues and Opportunities in Out-of-School Time Evaluation. Vol. Vol. 10. Cambridge: Harvard Graduate School of Education; 2008. p. 1-12.
- Little, R.; Rubin, D. Statistical analysis with missing data. New York: John Wiley & Sons; 1987.
- Maisto, SA.; Carey, KB.; Bradizza, CM. Social learning theory. In: Leonard, KE.; Blane, HT., editors. Psychological theories of drinking and alcoholism. New York: Guildford Press; 1999. p. 106-163.
- Marsden J, Stillwell G, Barlow H, Boys A, Taylor C, Hunt N, et al. An evaluation of a brief motivational intervention among young ecstasy and cocaine users: No effect on substance and alcohol use outcomes. *Addiction*. 2006; 101:1014–1026. [PubMed: 16771893]
- Mason MJ, Posner A. Brief substance abuse treatment with urban adolescents: A translational research study. *Journal of Child & Adolescent Substance Abuse*. 2009; 18:193–206.
- McCambridge J, Slym RL, Strang J. Randomized controlled trial of motivational interviewing compared with drug information and advice for early intervention among young cannabis users. *Addiction*. 2008; 103(11):1809–1818. [PubMed: 18778385]
- McNeal RB Jr, Hansen WB, Harrington NG, Giles SM. How All Stars Works: An examination of program effects on mediating variables. *Health Education & Behavior*. 2004; 31(2):165–178. [PubMed: 15090119]
- Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people for change. 2nd ed.. New York, NY: Guilford Press; 2002.
- Monti PM, Barnett NP, Colby SM, Gwaltney CJ, Spirito A, Rohsenow DJ, et al. Motivational interviewing versus feedback only in emergency care for young adult problem drinking. *Addiction*. 2007; 102(8):1234–1243. [PubMed: 17565560]
- Moyers TB, Martin T, Manuel JK, Miller WR, Ernst D. Revised Global Scales: Motivational Interviewing Treatment Integrity 3.1.1 (MITI 3.1.1). 2010 Retrieved from <http://casaa.unm.edu/mimanuals.html>.
- Murray, DM. Design and analysis of group-randomized trials. Oxford: Oxford University Press; 1998.
- Neighbors C, Lewis MA, Atkins DC, Jensen MM, Walter T, Fossos N, et al. Efficacy of web-based personalized normative feedback: A two-year randomized controlled trial. *Journal of Consulting and Clinical Psychology*. 2010; 78(6):898–911. [PubMed: 20873892]
- Orlando M, Ellickson PL, McCaffrey DF, Longshore DL. Mediation analysis of a school-based drug prevention program: Effects of Project ALERT. *Prevention Science*. 2005; 6:35–46. [PubMed: 15766004]

- Peterson PL, Baer JS, Wells EA, Ginzler JA, Garrett SB. Short-term effects of a brief motivational intervention to reduce alcohol and drug risk among homeless adolescents. *Psychology of Addictive Behaviors*. 2006; 20:254–264. [PubMed: 16938063]
- R Development Core Team. R: A language and environment for statistical computing. Vienna, Austria: R Foundation for Statistical Computing; 2009.
- Raghunathan TE, Solenberger PW, van Hoewyk J. IVEware: imputation and variance estimation software userguide. 2002
- Ridgeway G, McCaffrey D, Morral A. twang: Toolkit for weighting and analysis of nonequivalent (Version 1.0-1). 2006 <http://cran.r-project.org/src/contrib/Descriptions/twang.html>.
- Rollnick, S.; Miller, WR.; Butler, CC. Motivational interviewing in health care: Helping patients change behavior. New York: Guilford Press; 2008.
- SAMHSA. [April 1, 2009] SAMHSA's national registry of evidence based programs and practices. 2009. from <http://www.nrepp.samhsa.gov/index.asp>
- SAS Institute. SAS 9.2 Help and Documentation. Cary, NC: SAS Institute Inc.; 2008.
- Schafer JL. Multiple imputation: A primer. *Statistical Methods in Medical Research*. 1999; 8:3–15. [PubMed: 10347857]
- Schafer JL, Graham JW. Missing Data: Our view of the state of the art. *Psychological Methods*. 2002; 7:147–177. [PubMed: 12090408]
- Shillington AM, Clapp JD. Self-report stability of adolescent substance use: Are there differences for gender, ethnicity and age? *Drug and Alcohol Dependence*. 2000; 60(1):19–27. [PubMed: 10821986]
- Spirito A, Monti PM, Barnett NP, Colby SM, Sindelar H, Rohsenow D, et al. A randomized clinical trial of a brief motivational intervention for alcohol-positive adolescents treated in an emergency department. *Journal of Pediatrics*. 2004; 145:396–402. [PubMed: 15343198]
- St. Pierre TL, Kaltreider DL, Mark MM, Aikin KJ. Drug prevention in a community setting: A longitudinal study of the relative effectiveness of a three-year primary prevention program in Boys & Girls Clubs across the nation. *American Journal of Community Psychology*. 1992; 20:673–706. [PubMed: 1302446]
- Sterling S, Weisner C, Hinman A, Parthasarathy S. Access to treatment for adolescents with substance use and co-occurring disorders: Challenges and opportunities. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2010; 49:637–646. [PubMed: 20610133]
- Thush C, Weirs RW, Moerbeek M, Ames SL, Grenard JL, Sussman S, et al. Influence of motivational interviewing on explicit and implicit alcohol-related cognition and alcohol use in at-risk adolescents. *Psychology of Addictive Behaviors*. 2009; 23(1):146–151. [PubMed: 19290699]
- Wagner EF, Tubman JG, Gil AG. Implementing school-based substance abuse interventions: Methodological dilemmas and recommended solutions. *Addiction*. 2004; 99(Suppl2):106–119. [PubMed: 15488109]
- Wandersman A, Florin P. Community interventions and effective prevention. *American Psychologist*. 2003; 58:441–448. [PubMed: 12971190]
- WestEd. California Healthy Kids Survey. 2008 Available at: www.wested.org/hks.
- Wu P, Hoven CW, Tiet Q, Kovalenko P, Wicks J. Factors associated with adolescent utilization of alcohol treatment services. *American Journal of Drug & Alcohol Abuse*. 2002; 28:353–369. [PubMed: 12014820]
- Zief, SG.; Lauver, S.; Maynard, R. The impacts of after-school programs on student outcomes: A systematic review for the Campbell Collaboration. Campbell Coporation; 2006. Campbell Systematic Reviews: www.campbellcollaboration.org:

Ia. Alcohol consumption in past month and lifetime: Intention to treat (whole school) results; $p < 0.05$ for lifetime use.

Ib. Alcohol consumption in past month and lifetime: Project CHOICE attenders versus matched controls.

Figure I.

Table 1

Demographic information for the baseline sample (N = 8932)

Variable	Control % N=4689	Intervention % N=4243
Gender		
Female	50	51
Male	50	49
Race		
Non-Hispanic White	14	17
Non-Hispanic African-American	3	4
Hispanic	56	52
Asian	16	17
Other	11	10
Grade		
6 th grade	31	34
7 th grade	32	34
8 th grade	37	32
Mother Education		
No high school	11	9
High school	14	13
Some college	9	10
College	33	38
Don't know	34	30
Father Education		
No high school	11	9
High school	11	12
Some college	7	8
College	30	35
Don't know	41	37
Family Living Situation		
Mother and Father	57	61
Parent + stepparent	6	5
Female dominated household	22	21
Male dominated household	4	3
Other	11	9

Table 2

Descriptive statistics for outcomes at baseline and follow-up, N=9528*

Outcome	Time	Control		Intervention	
		Mean (SD) / %	Follow up	Mean (SD) / %	Follow up
Intervention School vs Control School (ITT)	Lifetime Alcohol Use	19.1%	29.0%	16.7%	22.2%
	Past Month Alcohol Use	8.1%	12.9%	6.8%	9.7%
	Heavy Drinking in Past Month	3.3%	6.1%	3.9%	4.5%
	Perceived Alcohol Use	1.98 (1.80)	2.50 (2.27)	1.76 (1.64)	2.37 (2.16)
	Alcohol Intentions	8.7%	9.4%	6.9%	7.6%
	Resistance Self-Efficacy (Alcohol)	3.57 (0.77)	3.46 (0.82)	3.63 (0.70)	3.48 (0.79)
Attendees vs Propensity Matched Controls	Lifetime Alcohol Use	17.5%	28.3%	16.9%	22.7%
	Past Month Alcohol Use	7.1%	11.8%	6.8%	10.5%
	Heavy Drinking in Past Month	2.2%	5.4%	1.9%	4.4%
	Perceived Alcohol Use	1.69 (1.69)	2.33 (2.14)	1.64 (1.54)	2.39 (2.27)
	Alcohol Intentions	17.7%	18.6%	15.0%	19.0%
	Resistance Self-Efficacy (Alcohol)	3.55 (0.24)	3.47 (0.25)	3.58 (0.80)	3.46 (0.80)

Note: *Perceived alcohol use* responses were recorded on an 11-point scale where zero or no students out of 100 were coded as "1", 10 students out of 100 were coded as "2", and so forth. *Alcohol intentions* were rated on a 4-point Likert scale from 1 (definitely no) to 4 (definitely yes). *RSE* items were rated on a scale ranging from 1 = "I would definitely drink" to 4 = "I would definitely not drink."

* this number differs from the baseline sample of 8932 as this sample includes both wave 1 and wave 2 students.

Table 3

Parameter Estimates from Generalized Estimating Equation Regression

Intervention School versus Control School						
Unadjusted Estimates						
Outcome	Estimate	SE	OR	NNT	D	
Lifetime Alcohol Use	-0.36**	0.12	0.70	14.7		
Past Month Alcohol Use	-0.32+	0.17	0.73	31.3		
Heavy Drinking in Past Month	-0.32	0.23	0.78	62.5		
Perceived alcohol use	-0.13	0.10				-0.06
Alcohol Intentions	-0.23	0.18	0.79	55.6		
Resistance Self-Efficacy (Alcohol)	0.02	0.04				0.02
Estimates Adjusted for Baseline Outcome and Covariates						
Outcome	Estimate	SE	OR	NNT	D	
Lifetime Alcohol Use	-0.36*	0.16	0.70	14.8		
Past Month Alcohol Use	-0.21	0.17	0.81	45.0		
Heavy Drinking in Past Month	-0.25	0.30	0.78	78.6		
Perceived alcohol use	0.03	0.09				0.02
Alcohol Intentions	-0.08	0.07	0.92	77.2		
Resistance Self-Efficacy (Alcohol)	0.02	0.03				0.03
Attendees vs Matched Controls						
Outcome	Estimate	SE	OR	NNT	D	
Lifetime Alcohol Use	-0.30	0.22	0.74	17.6		
Past Month Alcohol Use	-0.13	0.27	0.88	76.5		
Heavy Drinking in Past Month	-0.21	0.45	0.81	100.7		
Perceived alcohol use	0.09	0.15				0.05
Alcohol Intentions	0.10	0.14	1.11	67.4		
Resistance Self-Efficacy (Alcohol)	0.01	0.05				0.02

Note: D = standardized difference between groups; NNT = number needed to treat.

+ p < 0.10,

*
p < 0.05,
**
p < 0.01.