

Impact Analysis and Mediation of Outcomes: The Going Places Program

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The purpose of the study was to evaluate the impact of the Going Places Program and mediation of treatment effects. Seven middle schools were randomized to intervention or comparison conditions and students ($n = 1,320$) in two successive cohorts provided five waves of data from sixth through eighth grade. The Going Places Program included classroom curriculum, parent education, and school environment components. Latent growth curve analyses demonstrated significant treatment group effects on outcome expectancies, friends who smoke, and smoking. Friends who smoke mediated the program effect on adolescents' smoking progression. The protective effect of the Going Places Program on smoking progression was due in part to the prevention of increases in friends who smoke.

Keywords: *adolescents; randomized trial; problem behavior*

The rapid increases in substance use, aggression, and antisocial behavior during early adolescence (Addington, Ruddy, Miller, DeVoe, & Chandler, 2002; Johnston, O'Malley, & Bachman, 2003; Snyder & Sickmond, 1999) can represent a troubling deflection from positive and healthful development (Simons-Morton & Haynie, 2002) leading to long-term negative health and social consequences (Gruber, DiClemente, Anderson, & Lodico, 1996; Patterson, Reid, & Dishion, 1992; Weisberg, Kumpfer, & Seligman, 2003). Antisocial behavior is a particular problem for schools because much of this behavior occurs at school (Addington et al., 2002; Kingery, Coggeshall, & Alford, 1998), disrupting school routines, preoccupying teachers and administrators, and contributing to underachievement and dropout. Most schools provide programmatic attention to

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substance abuse (Wenter, Ennett, & Ribisl, 2002), but multiple problem prevention programs are relatively rare.

The effects of the Going Places Program on adolescent substance use and antisocial behavior was tested in a school-randomized trial. The program includes curriculum, parent, and school components; targets sixth through eighth graders; and attempts to change perceptions, attitudes, and skills that would enable and motivate students to try hard in school and refrain from engaging in problem behavior. In addition to individual-level goals, the program used multilevel programming (Flay, 2000) to increase parent and school support for positive youth behavior.

Going Places is based on the principles of social cognitive theory (Bandura, 1986), emphasizing efficacy and outcome expectations. Efficacy expectations reflect confidence in one's ability to perform certain tasks or behaviors. Outcome expectations are the expected social and personal consequences of anticipated behavior (Bandura, 1986). Outcome and efficacy expectations are influenced by perceptions about the behavior, normative expectations, actual experience, and relevant skills (Bandura, 1986). Close friends are particularly important in the development of outcome expectations because they are sources for normative perceptions and reinforcement (Dunn & Goldman, 1998; Epstein, Botvin, & Diaz, 1999; Petraitis, Flay, & Miller, 1995; Scheier & Botvin, 1997). The demands on social skills are acute during early adolescence, when youth gain increased independence and are exposed increasingly to complex and potentially difficult social situations (Simons-Morton & Haynie, 2002). Accordingly, deficiencies and delays in the development of social skills and competence can lead to poor decision making, low self-efficacy, antisocial attitudes, affiliation with problem-behaving friends, and other antisocial behavior (Aunola, Stattin, & Nurmi, 2000; Kipke, 1999; Paetsch & Bertrand, 1997; Resnick, Harris, & Blum, 1993; Vazsonyi & Flannery, 1997). Interventions that increase early adolescent social skills can also improve school engagement and commitment (Vazsonyi & Flannery, 1997), increase the potential for prosocial friendship development (Simons-Morton & Haynie, 2002), alter attitudes and perceptions about problem behavior (Morrison, Robertson, Laurie, & Kelly, 2002; Snyder & Sickmond, 1999), prevent substance abuse (Epstein, Griffin, & Botvin, 2000), and reduce adjustment and mental health problems (Weisberg et al., 2003). Most researchers evaluating social skills training approaches have focused on substance use (Botvin, 2000), and a few researchers have focused on multiple problem behavior prevention (Lockman & Wells, 2002). Although social skills training to prevent multiple problem behavior would appear to be a promising approach, it is unclear how best to foster skills development among early adolescents across a number of problem behaviors within the limits of a single school-based program (Johnson, MacKinnon, & Pentz, 1996).

In previous analyses of the data from the Going Places study, a variety of partially overlapping perceptions and attitudes, including outcome expectations, social competence, peer norms, peer affiliation, and parenting behaviors, have been linked to substance use (Simons-Morton, 2002, 2004; Simons-Morton, Chen, Abroms, & Haynie, 2004; Simons-Morton & Haynie, 2003; Simons-Morton, Haynie, Crump, Eitel, & Saylor, 2001), aggression (Simons-Morton, Hartos, & Haynie, 2004), and school engagement (Simons-Morton & Crump, 2003). Growth curve analyses of program effects demonstrated significant treatment group differences on smoking but had no significant effects on drinking or antisocial behavior (Simons-Morton, Haynie, Saylor, Crump, & Chen, 2004). The purpose of this article is to examine the impact of the program on intermediate outcomes and mediation of program outcomes.

METHOD

Design and Study Participants

The seven middle schools in one Maryland school district were randomized, three to the treatment and four to the comparison condition. Starting with the 1996 school year, two successive cohorts of sixth-grade students were recruited and surveyed at the beginning and end of the sixth grade and toward the end of seventh and eighth and beginning of ninth. Students in the treatment schools were exposed to Going Places, a multiple component intervention designed to increase school engagement and prevent increases in smoking, drinking, and antisocial behavior.

The population of interest included 2,969 students eligible to participate in the Time 1 assessment. Special education students who were mainstreamed were included but those who attended special education classes exclusively were not included based on pilot testing that found that these students were not able to provide reliable data. Of the 2,969 eligible students, 2,651 (87.8%) provided consent while in the sixth grade. When consent was obtained again on entry into high school in the ninth grade, 59 parents refused consent and 242 students failed to return completed forms, leaving a sample of 2,350 with consent (79.2%). Of these, 119 became ineligible during the study by failing a grade or being newly classified as special education, leaving a sample of 2,231. Of the remaining sample, 32 moved out of the school district and 715 were absent and missed an assessment, leaving a final sample of 1,484. Compared with the final sample, study participants lost to follow-up were significantly more likely to be Black, live with only one parent, and to report smoking, drinking, and antisocial behavior. Blacks were more likely to have been lost in the intervention than the comparison group; however, attrition by treatment group otherwise did not vary by sex, number of parents, smoking, drinking, or antisocial behavior.

Intervention

The Going Places program includes a social skills curriculum, parent education, and school environment enhancement designed to increase academic engagement and prevent increases in smoking, drinking, and aggressive behavior. The intervention components were based on social cognitive theory (Bandura, 1986) and on previous research on social skills training (Schinke, Botvin, & Orlandi, 1991), school environmental change (Gottfredson, 1986), and social development (Kumpfer & Turner, 1991), and designed to be consistent with recommended best prevention practices (Botvin, 2000; Nacion et al., 2003). The program sought to provide positive and reciprocal person-environment influences during the critical period of early adolescent development known as the adolescent transition.

Notably, during early adolescence, peer groups form and become increasingly important and influential, perceptions and attitudes change dramatically, and the demands of school and social interaction require the rapid development of sophisticated problem-solving and social skills (Simons-Morton & Haynie, 2002). Social influences, attitudes, skills, and competence are dynamic and reciprocal, with peers influencing attitudes and behavior, and behavior influencing peer selection and attitudes (Dishion, Capaldi, Spracklen, & Li, 1995). Adolescents with well-developed social skills may be better able to select friends, negotiate difficult social situations, balance social demands with social responsibilities, and maintain control over their behavior. Accordingly, the primary

Going Places component is a curriculum designed to influence perceptions, attitudes, and expectations about substance use and antisocial behavior and to improve self-efficacy and social skills and competence.

The Going Places curriculum consists of 18 class lessons offered in the sixth grade, 12 lessons in the seventh grade, and 6 lessons in the eighth grade. The curriculum provides skills instruction in problem solving, self-management, self-control, school involvement, communication, and conflict resolution. A typical lesson includes a trigger videotape (featuring local talent and locations) in which common problems are presented and problem-solving approaches are modeled by student actors. Teachers led discussions of the relevant skills and facilitated interactive group and role-play activities, allowing the students to put the situations into their own words and providing them with practice applying the skills to personally relevant situations. Meanwhile, the teachers and group leaders (students) offered constructive feedback following a script prepared for that session. Several sessions were clustered around specific problem-solving skills, including communication, resolution, and self-control, each session dealing with the same skill but with application to a different behavior—school engagement, smoking, drinking, aggression. The curriculum was delivered by language arts teachers, who received a 6-hour training session for each curriculum unit, including 3 days of training in sixth and seventh grade and 1 day in eighth grade. Continuing support was provided to teachers by a master teacher on the research staff. Teacher training emphasized (1) *authoritative* classroom management techniques in which teachers were encouraged to be demanding and responsive, (2) interactive and cooperative learning methods, and (3) constructive feedback.

The enhanced school environment component included social marketing strategies to improve school climate, establish realistic, prosocial norms, establish a positive image for the school, reinforce student achievement, and extend Going Places curriculum concepts to the larger school environment. Activities designed to extend the classroom lessons included informational “roll-outs” preceding each unit, posters and short video segments presented in the cafeteria and display areas, travelers’ checks awarded to students by a teacher for applying skills learned in a Going Places lesson, and special activities, such as assemblies and a year-end field trip, that students could earn the right to attend by participating in class activities and demonstrating skills outside the classroom, which were systematically rewarded.

The parent education component was designed to increase parental involvement and expectations regarding academic engagement and problem behavior. Sixth-grade parents received in the mail a 20-minute instructional video on authoritative parenting and a 20-page booklet entitled *Attentive Parenting: The Going Places Guide for Parents of Middle School Students*. Periodically, in the sixth and seventh grades, students were assigned homework that required the involvement of a parent or guardian. Participating families received periodic newsletters about the Going Places Program that included information about what the students were learning in the curriculum and provided quotes from students and teachers about the norms, importance, and skills related to school engagement and avoiding antisocial behavior.

Measurement

Questionnaires were administered in class and during makeup sessions. Two trained proctors per classroom administered surveys to intact classes of approximately 30 students each. As required by the school district, teachers remained to manage the classroom

but were instructed not to circulate around the room or otherwise be involved in the conduct of the survey. To protect confidentiality, students completed and turned in a cover page that included name, survey identification number, birth date, and homeroom teacher's name. The cover page was kept separate from the questionnaires, which included only a numerical identifier matching the one on the cover page.

Demographic Variables. The questionnaires included items on sex, race, study-school attended, mother's level of education, and membership in a single- or two-parent family.

Outcome Variables. Youth were asked how many times they have smoked a cigarette and drank alcohol (in the past 30 days and past 12 months) and how often they intend to smoke cigarettes and drink alcohol while in high school. Smoking (Pierce, Choi, Gilpin, Merritt, & Farkas, 1996) and drinking (Kandel, Kessler, & Margulies, 1978) can be characterized as advancing in stages. Accordingly, we treated our measures of smoking and drinking as ordinal categorical variables, with nonoverlapping categories of never (non-users), future intent (intenders), 12-month (12-month user), 30-day (recent users), and 3 or more times in the past 30 days (frequent users). Antisocial behavior was assessed by an index of items that asked how often in the past year the youth had been in a physical fight, been in a physical fight in which someone got hurt, bullied or picked on someone younger or weaker, lied to parents or guardian about where they were or whom they were with, gone someplace dangerous or off-limits, stole something from a person or store, or carried a weapon.

Intermediate Outcome Variables. The indices of the hypothesized mediators of adolescent problem behavior are described in Table 1 and in detail elsewhere (Simons-Morton, 2002, 2004; Simons-Morton & Crump, 2003; Simons-Morton et al., 2001; Simons-Morton, Haynie, et al., 2004; Simons-Morton, Chen, et al., 2004; Simons-Morton, Hartos, et al., 2004; Simons-Morton & Haynie, 2003). These variables include problem-behaving friends, outcome expectations, deviance acceptance, self-efficacy, social competence, school engagement, parental involvement, and parental expectations.

ANALYSIS

Information on implementation was obtained from teachers, scheduled staff observations, student knowledge tests, and student reports of participation collected at the end of each unit. Telephone interviews were conducted with a volunteer sample of 45 parents. The average prevalence in each treatment group was calculated for each problem behavior, and the treatment effect was examined using latent growth curve (LGC) modeling (Curran, 2000; L. K. Muthen & Muthen, 2001). The psychosocial variables targeted by the intervention were examined to identify possible treatment effects and statistically evaluated using the methodology specifically designed for testing intervention effects within the LGC framework (B. O. Muthen & Curran, 1997). In this methodology, the growth factors are first equated for treatment and control groups. An additional growth factor for the treatment group will be examined. A positive mean of the additional growth factor indicates additional growth for the treatment group due to intervention and vice versa. The LGC methodology recommended by MacKinnon and Dwyer (1993) and Cheong, MacKinnon, and Khoo (2003) was used to statistically test the mediating process between the treatment effect and the outcome variable. No data were imputed.

Table 1. Mean, Standard Error, *p* Value, and Confidence Intervals of the Added Growth Factor for Targeted Variables

Variable (No. of Items; Range; Alpha)	Mean (<i>SD</i>) (at Time 1)	Mean for Added Slope	Standard Error	<i>p</i> Value	95% Confidence Intervals	
					Upper	Lower
Problem-behaving friends (5; 0-20; .84)	3.37 (5.5)	-0.60**	0.223	.007	-0.17	-1.04
Friends who smoke (item; 0-5; item)	0.38 (0.90)	-0.21**	0.045	.000	-0.12	-0.30
Outcome expectation for smoking (5; 0-20; .71)	11.42 (3.8)	-0.30*	0.120	.014	-0.06	-0.53
Deviance acceptance (8; 0-16; .79)	1.56 (2.85)	-0.24	0.136	.073	0.02	-0.51
Social competence (8; 8-32; .79)	22.37 (5.39)	-0.14	0.173	.432	0.20	-0.48
Communication self-efficacy (3; 3-12; .72)	20.57 (3.55)	-0.08	0.127	.529	0.17	-0.33
Parent involvement (4; 4-16; .77)	20.36 (3.2)	0.12	0.080	.127	0.28	-0.03
Parent expectations (6; 6-24; .77)	15.75 (2.26)	0.05	0.106	.657	0.25	-0.16

NOTE: The fit indices of the model for school engagement did not reach fit level. The results are not presented.

RESULTS

Program Implementation

The extent and quality of program implementation was good, with most curriculum sessions completed with high fidelity and good student participation and satisfaction. Teachers reported completing 95% of the lessons in sixth grade and 84% in seventh grade. During scheduled observations, teachers completed all core lessons. Teacher ratings of the percentage of students fully participating in the lessons, including attention to the videos, participation in discussions and group activities, staying on task, and enthusiasm, were 90% in the sixth grade and 88% in the seventh grade. On average, 77% of sixth-grade students and 65% of seventh-grade students indicated usually or always paying attention to the Going Places classes. Overall, 71% of students indicated that they liked the classroom activities and 70% considered the program helpful to their lives, with 54% reporting that they used the skills from the program at school and 41% indicating that they used program skills outside school. On knowledge tests, 80.9% of students scored $\geq 90\%$, 90.2% scored $\geq 80\%$, and 4.4% scored $< 70\%$. Of 45 volunteer parents interviewed, 40 indicated that they or their spouse viewed the video and parenting booklet, of which 80% reported liking these materials. School environmental enhancement activities were implemented according to the protocol without exception.

Program Outcomes

In previous analyses (Simons-Morton, Haynie, et al., 2004), average increases in the smoking stage were found to be significantly lower for the students exposed to Going Places compared to students in the control group, as shown in the line graph in Figure 1. The multigroup comparison analyses (Cheong et al., 2003; B. O. Muthen & Curran, 1997) showed a significant ($p < .05$) decrease in the rate of smoking progression for the treatment group relative to the control group. The primary effect was slower growth in smoking progression among those with some smoking experience. ANCOVA comparing average smoking stage at each time point controlling for baseline smoking indicated significant differences at S6 ($F_{1,1317} = 6.06, p = .014$), S7 ($F_{1,1317} = 12.2, p = .001$), and F9 ($F_{1,1317} = 8.4, p = .004$), with lower average smoking stage in the intervention than the control group. Negligible treatment group differences were found for drinking and antisocial behavior.

Program Impact

Line graphs shown in Figure 2 show differences favoring Going Places compared to the comparison group in the trajectories for the number of friends who smoke, problem-behaving friends, outcome expectations for smoking, and deviance acceptance. Intermediate variables were tested individually for treatment effects using the model recommended by B. O. Muthen and Curran (1997). Table 1 presents the mean, standard error, p value, and confidence intervals for the added slope factor for the targeted intermediate variables. The number of friends who smoked was 0.21 lower each year for the treatment group relative to the control group ($p < .001$), whereas the average number of problem-behaving friends was 0.60 lower ($p < .05$) and deviance acceptance was 0.24 lower ($p = .073$). Parent involvement and parent expectation favored the treatment group but not sig-

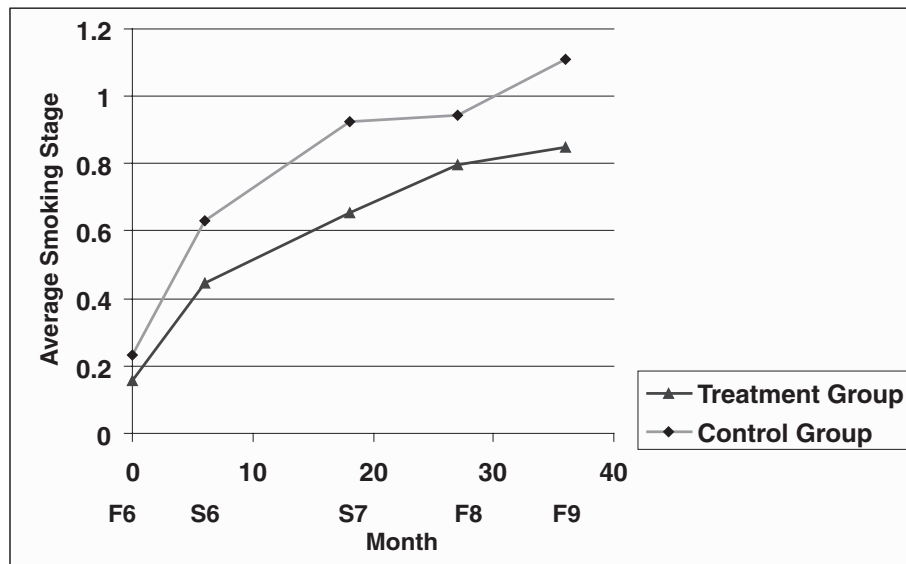


Figure 1. Adolescents' average smoking stages from sixth grade fall semester to ninth grade fall semester for treatment ($n = 692$) and control groups ($n = 628$).

nificantly, and the means for the added slope for other variables did not approach significance.

Figure 3 presents the model for evaluating treatment effects using outcome expectation for smoking as an example. In this model, the control group and treatment group were constrained exactly the same for the intercept and the slope factors, except that the treatment had an additional growth factor. For outcome expectation for smoking, the model fits well with $\chi^2(6) = 5.94, p = .43$; comparison fit index (CFI) = 1.0, Tucker-Lewis index (TLI) = 1.0, and root mean square error of approximation (RMSEA) = 0.00. The mean for the added slope factor is $-0.30 (p < .05)$, indicating a significant treatment effect with an average difference of 0.3 units per year on the outcome expectation measurement scale in the intervention group relative to the control group.

Mediation of Program Effects

Having found a treatment effect on smoking progression and for several targeted intermediate outcomes, we tested the mediation of treatment effects following the methodology proposed by Cheong et al. (2003). Because the treatment effect occurred among those with some smoking experience, nonsmokers were eliminated from the mediation analyses, thereby improving the model fit. Accordingly, a mediator was defined to have a slope with a significant path from the intervention effect and a significant path leading to the slope of the outcome variable. The model testing friends who smoke as a possible mediator is presented in Figure 4. The standardized estimate from Intervention to the slope of friends who smoke is 0.16 ($p < .01$). This negative coefficient indicates that the treatment had the effect of reducing the number of friends who smoke across the time. Meanwhile, the slope of friends who smoke predicts the slope of adolescents' smoking

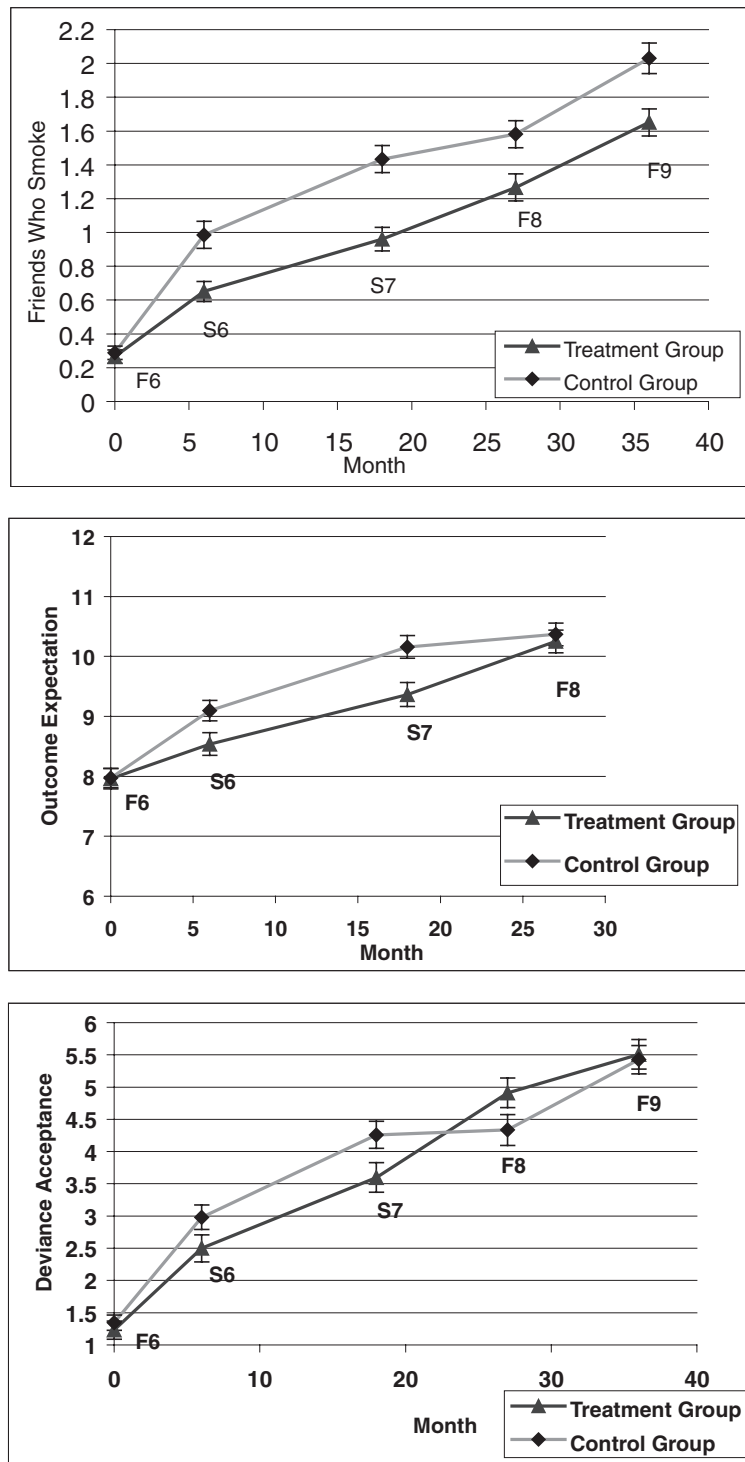


Figure 2. Trajectories of friends who smoke, outcome expectations, and deviance acceptance for treatment ($n = 384$) and control ($n = 366$) groups.

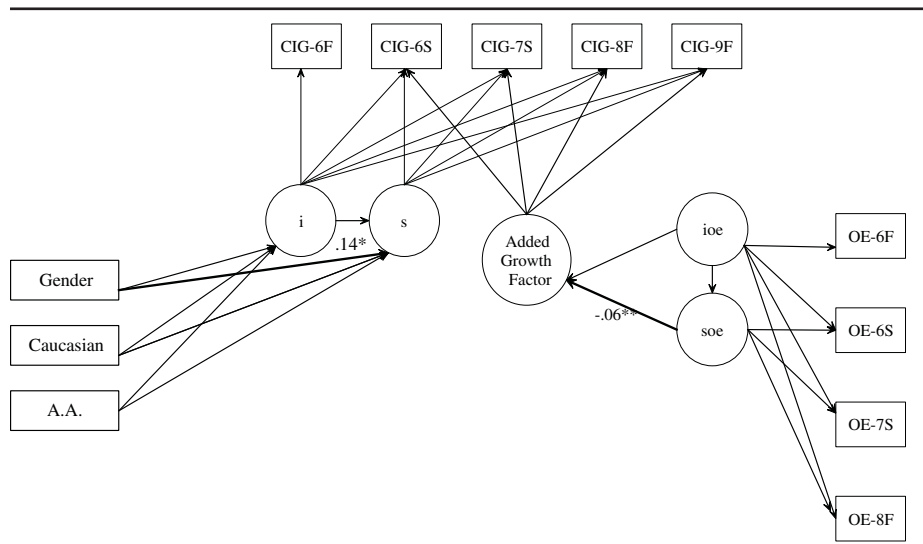


Figure 3. Multigroup comparison of control versus treatment group to evaluate the effect of outcome expectation to the added growth factor for treatment group.

NOTE: CFI = .915, TLI = .909, RMSEA = .125. Mean of adjusted added growth factor = $-.154^*$; variance = $.03^*$. AA = African American; CFI = comparison fit index; CIG = cigarettes; i = intercept; ioe = intercept of outcome expectations; OE = outcome expectations; RMSEA = root mean square error of approximation; s = slope; soe = slope of outcome expectations; TLI = Tucker-Lewis index.

with the standardized estimate of 0.70 ($p < .01$), indicating that the decrease of friends who smoke reduced the progression of smoking. Therefore, friends who smoke is a mediator between the intervention and adolescents smoking. Other targeted mediators, including self-efficacy, outcome expectation, academic engagement, deviance acceptance, parent involvement, and parent expectations, were statistically tested in similar fashion. Although the standardized estimates between intervention and these variables were in the right direction, none reached statistical significance.

DISCUSSION

Randomized trials are employed to evaluate the effects of health promotion programs on targeted outcomes and also allow examination of how program effects may have occurred. Impact analyses provide information about the extent to which the program had an effect on targeted intermediate outcomes, and mediational analyses provide information about the extent to which changes in intermediate outcomes led to changes in program outcomes. Hence, impact and mediation analyses contribute to our understanding of program integrity, enabling programmers to modify the program content accordingly. Mediation analyses in particular can contribute to our theoretical understanding of health behavior and change.

The results of these analyses indicate that the Going Places Program prevented smoking progression and reduced growth in the number of friends who smoke, outcome expectations, and deviance acceptance. Probably the combined program effects on these intermediate outcomes led to the treatment effect on smoking progression. However, only the

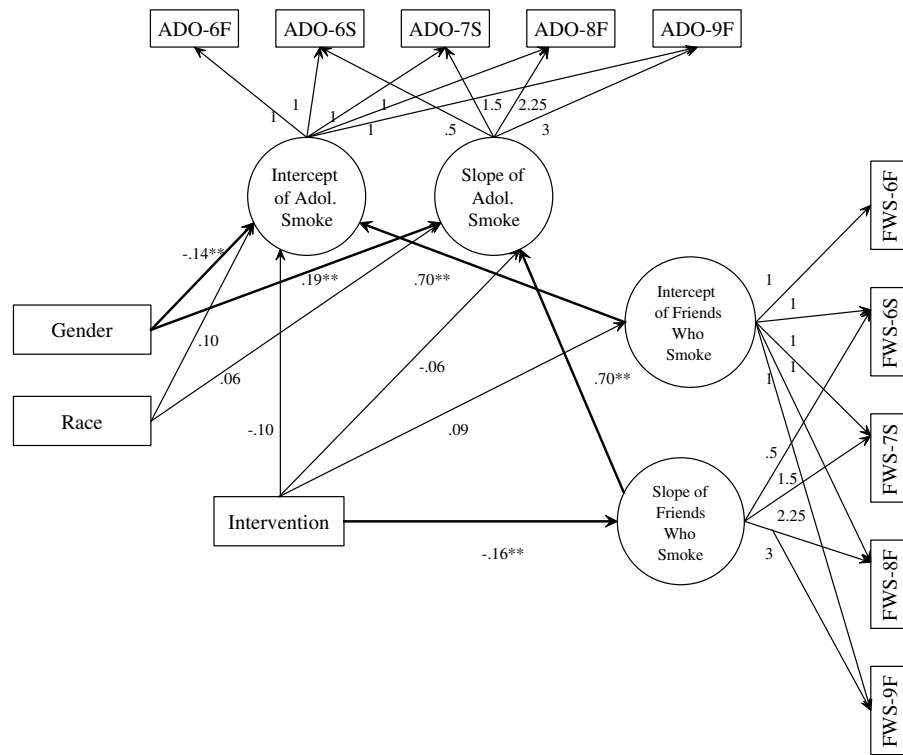


Figure 4. Friends who smoke as a mediator as the result of treatment effects.
 NOTE: CFI = 0.92, TLI = 0.92, RMSEA = 0.07. ADO = adolescent; CFI = comparison fit index; FWS = friends who smoke; RMSEA = root mean square error of approximation; TLI = Tucker-Lewis index.
 $^{**}p < .01$.

program effect on growth in the number of friends who smoke was found to mediate the effect on smoking progression. The findings are consistent with a social cognitive understanding of smoking behavior, suggesting that close peers influence adolescent behavior by modeling behavior and by their influence on adolescent perceptions of norms and outcome expectations (Bandura, 1986).

The strengths of the study include a school-randomized design, an extensive theory-based intervention, adequate implementation (Hansen, Graham, Wolkenstein, & Rohrbach, 1991), well-defined outcome measures, and the use of latent growth modeling for analyses. However, the study is limited by its small, regional sample and differential loss to follow-up of high-risk youth. Fortunately, loss to follow-up did not differ between treatment groups, allowing for an unbiased evaluation of program effects.

In general, it has proven difficult to prevent adolescent problem behavior. One review (Tobler, 1986) found that only about 50% of the best-designed studies reported significant treatment group effects. Smoking has been somewhat less difficult to prevent than drinking or antisocial behavior (Tobler, 1986; Tobler & Statton, 1997), as was the case with Going Places. Even small reductions in adolescent smoking may be important given the health and social costs of early experimentation (Chassin, Presson, Sherman, & Edwards, 1990; Gruber et al., 1996). Nevertheless, a significant treatment group effect on

smoking, but nonsignificant effects on drinking or antisocial behavior, indicates only partial program effectiveness.

Mediational analyses are not commonly reported (Baron & Kenny, 1986). In a large school-based trial, MacKinnon et al. (1991) reported the effects of a social-influences drug prevention program on targeted hypothesized mediating variables and found that change in perceptions of friends' tolerance of drug use and beliefs about the positive consequences of use mediated program effects. These findings are quite similar to the findings reported here for Going Places, although the measures employed by MacKinnon et al. focused on a measure of multiple drug use and our measure of outcome expectations combines aspects of friends' tolerance and perceive consequences of smoking. Unfortunately, MacKinnon et al. did not report program effects on the number of substance using friends. Trudeau, Spoth, Lillehoj, and Redmond (2003) reported a marginal effect of refusal intentions and outcome expectations and hypothesized that it mediated program effects on substance use initiation, similar to our findings, except that their program effects were on substance use initiation and our effects were on smoking progression.

IMPLICATIONS FOR PRACTICE

This is the first study to report a significant treatment effect on friends who smoke as a mediator of program effects on smoking progression. It is well established that the behavior of close peers is highly associated with adolescent problem behavior (Eiser, Morgan, Gammage, Brooks, & Kirby, 1991). Because the prevalence of problem behavior, particularly smoking and drinking, increases during adolescence and friendship development is dynamic during this period (Simons-Morton & Haynie, 2002), it makes sense for interventions to target prosocial friendship development. The results indicate that it is possible for school-based prevention programs to alter the growth in friends who smoke during early adolescence and that such alteration can prevent smoking progression.

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