A RAND NOTE

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Antecedents of Drinking among Young Adolescents with Different Alcohol Use Histories*

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ABSTRACT. Testing separate path analytic models for 7th-grade users and nonusers, we assess the impact of cognitive, social influence and behavioral antecedents on adolescent drinking 3 and 12 months later. For the group that had not tried alcohol by grade 7, we found that social influence factors—exposure to peers who drink or use marijuana and to adults who drink—foster more frequent alcohol use and binge drinking in the near future (3 months later). The key peer influences on binge drinking were marijuana-specific. After 12 months, the child's own drinking experience during grade 7 and peer and parental attitudes toward drugs emerge as important explanatory variables. For children who had already started drinking by grade 7, cognitive—as well as social and behavioral factors—affect near- and longer-term alcohol involvement. While the child's prior drinking habits have the strongest impact, baseline expectations of using alcohol also predict frequency of alcohol use and binge drinking after 3 and 12 months. Believing that alcohol use is harmful helps hold down increases in frequency of use (but not excessive use) as long as 12 months later. Engaging in deviant behavior or doing poorly in school did not predict future drinking among baseline nonusers, but did foretell which of the 7th-grade initiates were most likely to engage in binge drinking during grade 8. The study's implications for prevention are discussed. (*J. Stud. Alcohol* **52:** 398-408, 1991)

IDENTIFYING the psychosocial variables that affect adolescent alcohol use and understanding how they operate are critical for designing and evaluating prevention programs (Botvin et al., 1984; Chassin et al., 1984). Recent prevention efforts, acknowledging the central role of social influences in alcohol initiation, have sought to help young people identify and resist social pressures to drink (e.g., Dielman et al., 1986; Ellickson and Bell, 1990; Hansen et al., 1988). Most of these efforts also seek to motivate young people against early or irresponsible drinking by altering their perceptions about alcohol—adolescent beliefs about how drinking affects them, their expectations about future use, or their reasons for drinking. Such perceptions have been shown to predict future drinking as well (Smith et al., 1986).

While an understanding of how and why young people begin experimenting with alcohol has informed these programs, less attention has been paid to identifying and combating factors that promote subsequent use and drinking to excess. However, factors that predict initial involvement may be less critical for explaining later use (Hansen et al., 1987; Kandel et al., 1978; Schlegel et al., 1985). For example, while parental drinking is a key predictor of alcohol onset, peer role models may become comparatively more important in promoting continued use during adolescence. Becoming involved in a broader drug culture increases the probability of becoming a problem drinker (Donovan and Jessor, 1983). Other "nonconforming" behaviors, such as poor academic performance and deviance, appear to discriminate those who become problem users from those whose drinking continues, but at a more moderate level (Barnes and Welte, 1986; Sadava, 1985).

In addition, the young person's prior use history may alter the explanatory power of important factors (Kandel et al., 1978). For initiates, previous drinking patterns are invariably the strongest predictors of increased involvement (Collins et al., 1987). Evidence from smoking studies suggests that cognitive variables have a greater impact on substance use after, rather than before, initiation (Chassin et al., 1984, 1985).

This study seeks to expand our understanding of how cognitive, social and behavioral factors differentially affect initial and subsequent alcohol involvement among young adolescents with different use histories. Using longitudinal data from Project ALERT, a multiyear smoking and drug prevention study (Ellickson, 1984; Ellickson et al., 1988a), we explore the impact of variables measured during grade 7 on alcohol use 3 and 12 months later. Because attributes that predict initial use may play different roles in fostering subsequent drinking, we separate those who had already started drinking by grade 7 from those who had not. Similarly, because the importance of predictors

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often varies depending on whether frequency or quantity of use is the focus, we evaluate the effect of antecedent variables on both frequency of use and drinking to excess.

Method

Design of study

Interpretation of directional influences in cross-sectional studies tends to be problematic because all variables are measured at the same point in time. Longitudinal designs strengthen the causal claim "by permitting the establishment of temporal order and sequence" (Jessor and Jessor, 1977, p. 9). In this study, we examine three waves of longitudinal data collected over a 12-month time interval—at baseline (when the students were in grade 7) and 3 and 12 months later. Henceforth, we refer to these three time points as Waves 1, 2 and 3.

Subjects

Students in the prevention study's 30 participating schools completed self-administered surveys of approximately 25 to 30 pages in length at each wave. Several steps were instituted to minimize response bias. To provide a stimulus for truth-telling, we collected a saliva sample from each student immediately before administration of the survey, informing the students that tobacco and marijuana can be detected in saliva and that the samples would be tested. Confidentiality measures included preventing teachers, parents or other nonresearch personnel from seeing student responses, using trained personnel to administer surveys, identifying student surveys by number rather than name and hand carrying sensitive data (separate sheets connecting names to ID numbers) from the school to RAND. We also obtained a Certificate of Confidentiality from the Department of Health and Human Services that precludes public or private individuals from obtaining individual data by subpoena. Parental consent for participation was obtained using a passive consent procedure (Ellickson and Hawes, 1989).

For the analyses presented here, 1,966 students in the 10 control schools were selected. These, and 20 treatment schools, were drawn from eight California and Oregon school districts in urban, suburban and rural communities. Because of the possible effects of the experiment on the relations among the constructs studied, we omitted treatment students from the analysis. The resulting sample was 48% female, 66% white, 12% Hispanic, 11% black, 7% Asian and 2% Native American. The average (± SD) age of the respondents at baseline of the study (grade 7) was 12.7 ± 0.5 years. At baseline, 23% of the students reported that they had never tried alcohol (ever use was defined as any use at all, even only a few sips).

Measures

Project ALERT survey instruments were designed after a comprehensive review of previous empirical and theoretical work (Ellickson et al., 1988a). Almost all of the selected questions had been successfully used in national surveys of adolescent drug use, although some were modified to accommodate the reading levels and experience of 7th and 8th graders. Five successive versions of the baseline survey were pretested before use in participating schools. These pretests allowed us to compare alternative versions for the frequency of problem indicators, such as missing data, internal inconsistencies and student questions indicating confusion, and to select the most successful items for the final instrument. Table A in the Appendix presents the psychosocial and behavioral concepts assessed in this study. Because of time constraints associated with classroom administration and the need to assess a wide range of antecedent variables, many of the concepts were represented by a single item.

Reliability

We estimated the reliabilities of the variables by test-retest correlations and, for multi-item scales, the alpha internal consistency coefficient (Cronbach, 1951). For baseline users, test-retest correlations were 0.50 or greater over the 3-month time interval in all but four instances—beliefs about harm, perceived respect for not using drugs, frequency of last month alcohol use and binge drinking (see Appendix, Table B). As expected, we observed somewhat more instability for baseline nonusers, with 11 correlations below 0.50 (see Appendix, Table C). A test-retest correlation is a function of the reliability of one's measure and natural change in the construct assessed. Thus, the relatively low test-retest values for the nonusers in part reflect natural change among these nonusers over the 3-month time period.

For the eight multi-item scales, we computed internal consistency reliabilities across the overall sample, yielding alpha reliability estimates exceeding 0.60 for each scale except those tapping self-esteem, resistance self-efficacy and academic performance/orientation. Reliabilities for the latter were 0.57, 0.52 and 0.47, respectively. In general, these multi-item measures are sufficiently reliable for group comparisons, but the reliability of the 2-item academic performance/orientation scale was just under the minimum 0.50 standard recommended by Helmstadter (1964).

Dependent variables. Frequency of current use was assessed using five response options: none, 1 or 2 days in the last month, 3 to 5 days in the last month, 6 to 19 days in the last month, 20 or more days in the last month. For baseline nonusers, this variable reflects whether or not they initiated alcohol use and the frequency of their initial

use. We measured heavy alcohol use (or binge drinking) by asking the number of days in the last month in which three or more drinks were consumed in a row (none, 1 day in the last month, 2 to 4 days in the last month, 5 to 8 days in the last month, more than 8 days in the last month). This variable, which taps the frequency of excessive use, reflects a level of drinking that puts young teenagers at considerable risk for experiencing serious consequences related to alcohol use.[1] Junior high students, whose body weight typically falls below average adult levels, are highly likely to become intoxicated after imbibing three drinks in a sitting. Being drunk makes them more likely to lose control, to exercise poor judgment and to engage in high-risk activities such as unprotected sex and riding with a drunk driver.

While these two dependent variables are moderately correlated, they are by no means synonymous. Correlations between frequency of current use and frequency of binge drinking ranged from 0.58 to 0.71 for baseline users (Waves 1–3) and nonusers (Waves 2 and 3 only).

Predictor variables. Personality variables included expectations of using alcohol, cigarettes and marijuana in the next 6 months; beliefs about harm from alcohol use; self-esteem; and resistance self-efficacy (the adolescent's belief that he or she can successfully resist pressure to drink). Because expectations—defined as an individual's self-prediction of his or her future behavior—have been shown to outperform intentions at predicting behavior (Warshaw and Davis, 1985), we assessed the former.

Social influence variables included number of offers of alcohol, cigarettes and marijuana and perceived use of alcohol, cigarettes and marijuana by peers and siblings. Because of objections from the schools, we did not ask about parental substance use directly. Instead, we asked students to report their perceptions of use by the "adult most important to you." For most students, this adult is their mother or father. (Hence when we refer to adult use of alcohol, we use "parental" and "adult" interchangeably.) We also assessed the impact of perceived peer and parental approval of each substance and perceived respect for not using drugs. These social influence factors are featured prominently in social learning theories of alcohol and other drug use and their explanatory importance has been supported extensively in previous research (e.g., Akers et al., 1979; Jaquith, 1981).

Behavioral variables included prior use of alcohol, cigarettes and marijuana, age of onset, deviance, school absences and academic performance. The analyses also controlled for gender, age, ethnicity and family living situation (nuclear family versus other).

Analysis plan

To identify significant antecedents of proximal and distal alcohol involvement among 7th graders, we examined constructs from several plausible approaches—theories that focus on the individual's social environment as well as those that stress his/her attitudinal and behavioral predispositions (Ajzen and Fishbein, 1980; Akers et al., 1979). We chose path analysis to explore the relationship between predictor variables and alcohol use because it allowed us to assess a large number of potentially important factors from multiple domains. In contrast, simultaneous estimation procedures place restrictions on the number of variables that can be studied.[2] We examined separate models for baseline nonusers (n = 280) and users (n = 909) who provided complete data at all three data collection points.[3] Except for prior alcohol use at Wave 2, we restricted the predictor variables to baseline measures, thereby allowing an evaluation of each antecedent's impact on near- and longer-term alcohol use. By controlling for the adolescent's intervening experience with alcohol (at Wave 2), we provide a more realistic picture of how early predispositions and environmental factors affect later use.[4]

We began with saturated regression models, including all antecedents as predictors of proximal (Wave 2) and distal (Wave 3) alcohol use. Adhering to the logic of MacCallum (1986), we then trimmed the models by deleting nonsignificant ($p > .05$) predictors one at a time. Separate regressions predicted alcohol use at the two longitudinal time points. For each regression model, the nonsignificant predictor with the largest probability level (i.e., least significant parameter) was removed, the model was reestimated, another nonsignificant predictor was removed, and so forth until all predictors remaining in the model were statistically significant. Next, we estimated models including any variable that was a statistically significant predictor of either Wave 2 or Wave 3 alcohol use. A traditional path analysis was performed by combining the results of these two regression equations into an overall model (cf., Mueller et al., 1977).

Results

Longitudinal path models of alcohol use

Figures 1-4 present multiple regression standardized parameter estimates for the statistically significant predictors of frequency of alcohol use and binge drinking. All predictors are scored in a direction consistent with their hypothesized relations with alcohol use: high scores on the predictors are expected to be associated with greater alcohol use; low scores on the predictors are expected to be related to less alcohol use. Thus, each antecedent should be positively associated with alcohol use if our hypotheses are correct.

Frequency of last month use: Baseline nonusers. Social influences clearly outrank cognitive and behavioral factors

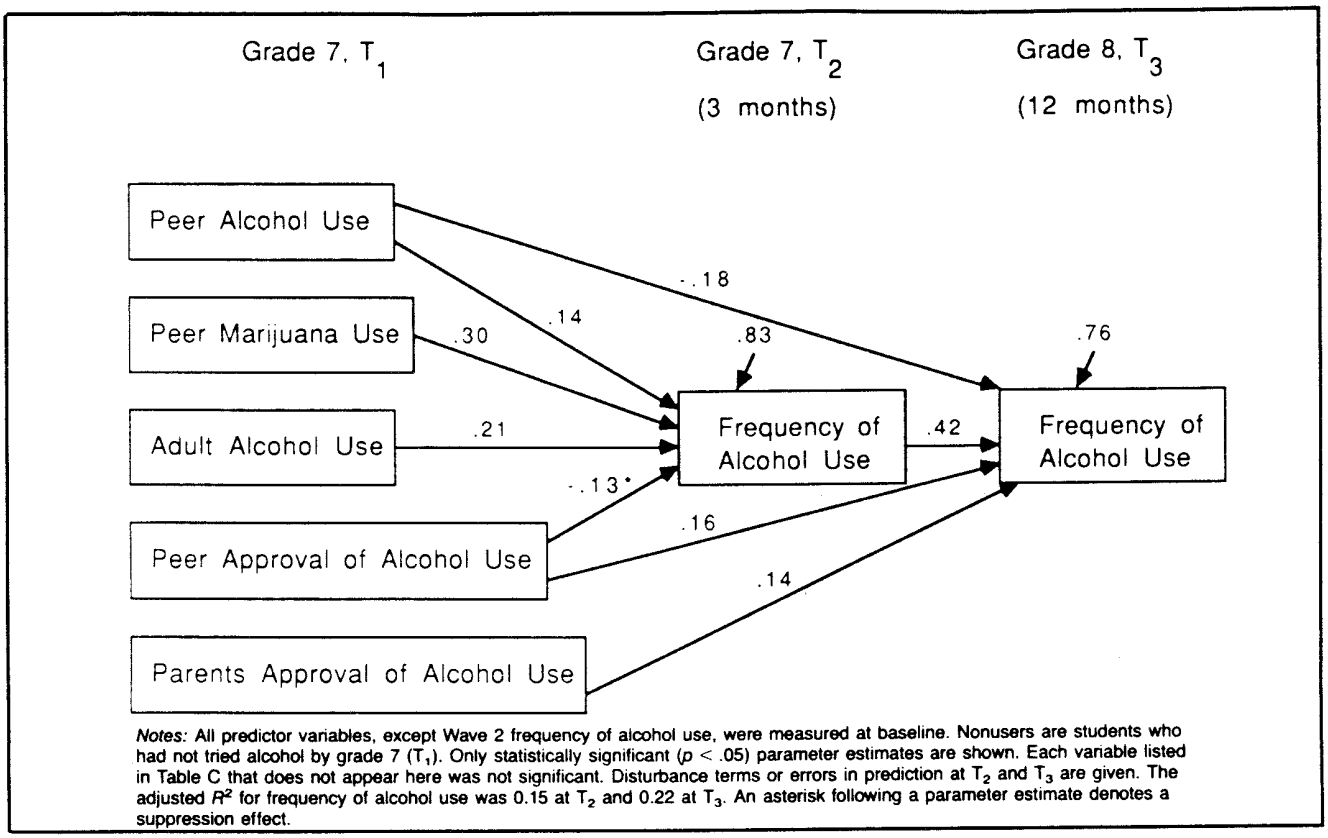

FIGURE 1. Future drinking among 7th-grade nonusers: Standardized regression effects of variables predicting frequency of last month use.

as predictors of initial involvement with alcohol (see Figure 1). For baseline nonusers, only three variables—peer marijuana use, adult alcohol use and peer alcohol use—show significant positive relationships with current drinking at Wave 2.[5] After 12 months, however, the frequency of current alcohol use is most strongly predicted by drinking patterns that had emerged by Wave 2. While social influences are still important, it is prior parents' and peers' *attitudes* (i.e., approval of use) about drinking, not their drinking behavior, that affect more distal use of alcohol. Adult alcohol use drops out as a significant predictor, but peer alcohol use, which has a positive effect on proximal drinking, actually has a negative effect on more distal use.[6] Neither prior personality nor behavioral attributes emerge as significant forerunners of alcohol use onset among children who have not tried alcohol by grade 7.

Frequency of last month use: Baseline users. For those who had started drinking by baseline, however, the story is quite different (see Figure 2). A cognitive variable—expectations of future alcohol use—has now become important, slightly outranking the frequency of baseline drinking as the most important predictor of continued use 3 months later. Both peer alcohol use and drinking opportunities (offers) have a stronger impact on continued use than does parental drinking, but the latter is still significant. Older siblings who smoke marijuana also foster more frequent current drinking among these early initiators.

After 12 months, the prior drinking patterns of these baseline users continue to promote current drinking, with the most recent (Wave 2) pattern being dominant. However, prior beliefs about the harmfulness of alcohol use now emerge as a protective factor, partially offsetting the continued impact of earlier predictions about one's future drinking. Heralded by the impact of sibling marijuana use 9 months earlier, prior marijuana use also fosters more frequent current drinking during grade 8: Alcohol users who had already started smoking marijuana at baseline are more likely than those who had not to increase the frequency of drinking a year later. Similarly, those who had engaged in other deviant behaviors, as well as those who had more opportunities to smoke cigarettes when in grade 7, also drink more frequently in grade 8.

Heavy drinking: Baseline nonusers. As Figure 3 shows, heavy drinking among these young adolescents appears to arise out of a different causal path than that for frequency of current use. For those who have not tried alcohol by grade 7, both exposure to other drugs and expectations of future drug use accelerate the path from alcohol onset to excessive use: being offered marijuana, knowing peers who use it and planning to use marijuana in the future all predict

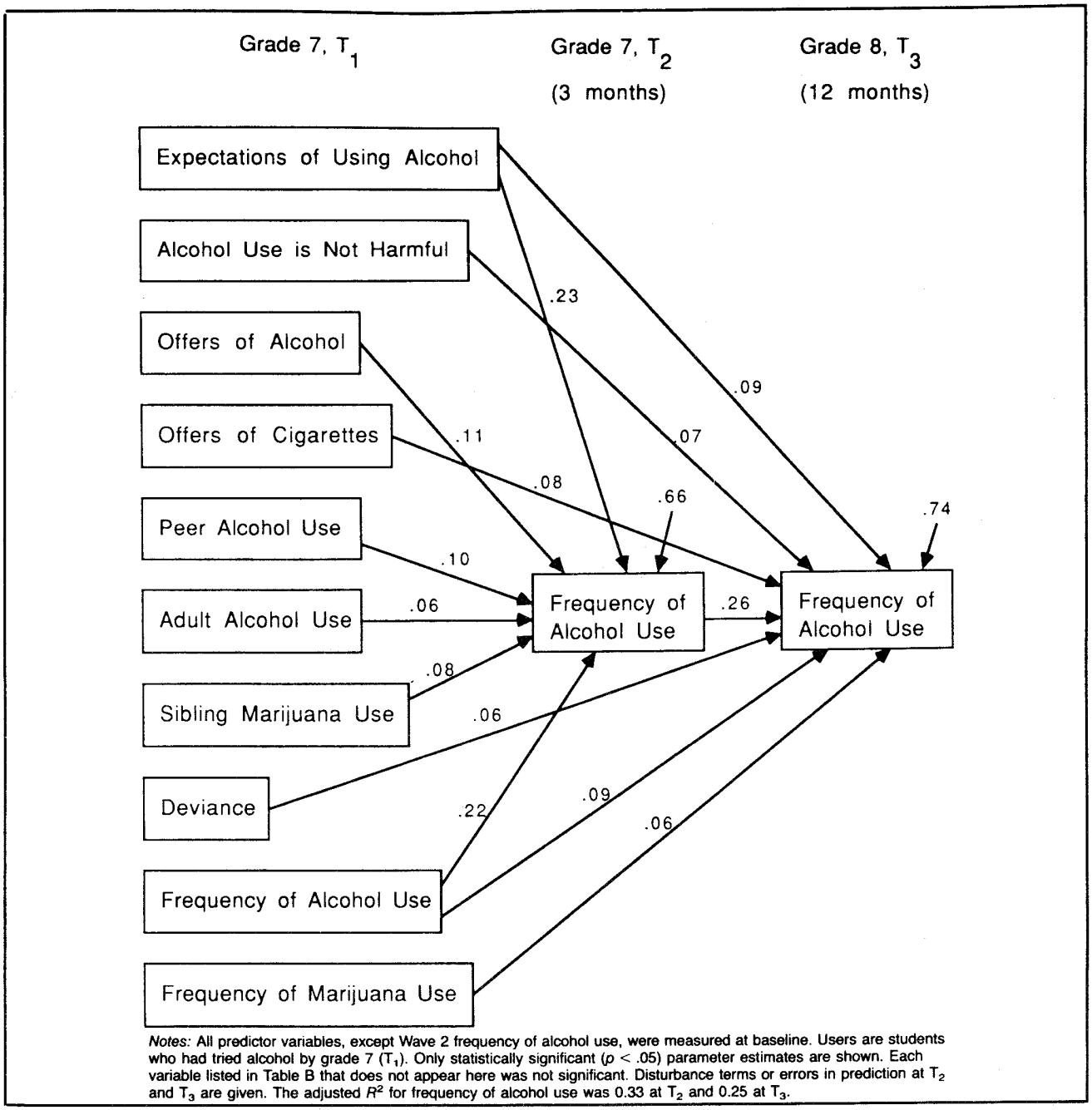

FIGURE 2. Future drinking among 7th-grade users: Standardized regression effects of variables predicting frequency of last month use.

binge drinking among these nonusers within a 3-month period. Parental drinking also plays a significant role.

For more distal heavy drinking, however, the child's prior history of excessive alcohol use during grade 7 (Wave 2) has the strongest impact. Peer approval of cigarettes, rather than alcohol, also has a substantial impact on later binge drinking, but parental drinking continues to foster excessive use over a 1-year span. As we might expect, beliefs about alcohol's harmful consequences (formed before these children had started to drink) do not dissuade these young adolescents from future binge drinking—within 3 *or* 12 months. Nor do pre-initiation expectations of future drinking presage more serious use.

Heavy drinking: Baseline users. In contrast, expectations about future use do predict heavy drinking for students with prior alcohol experience (see Figure 4). Along with

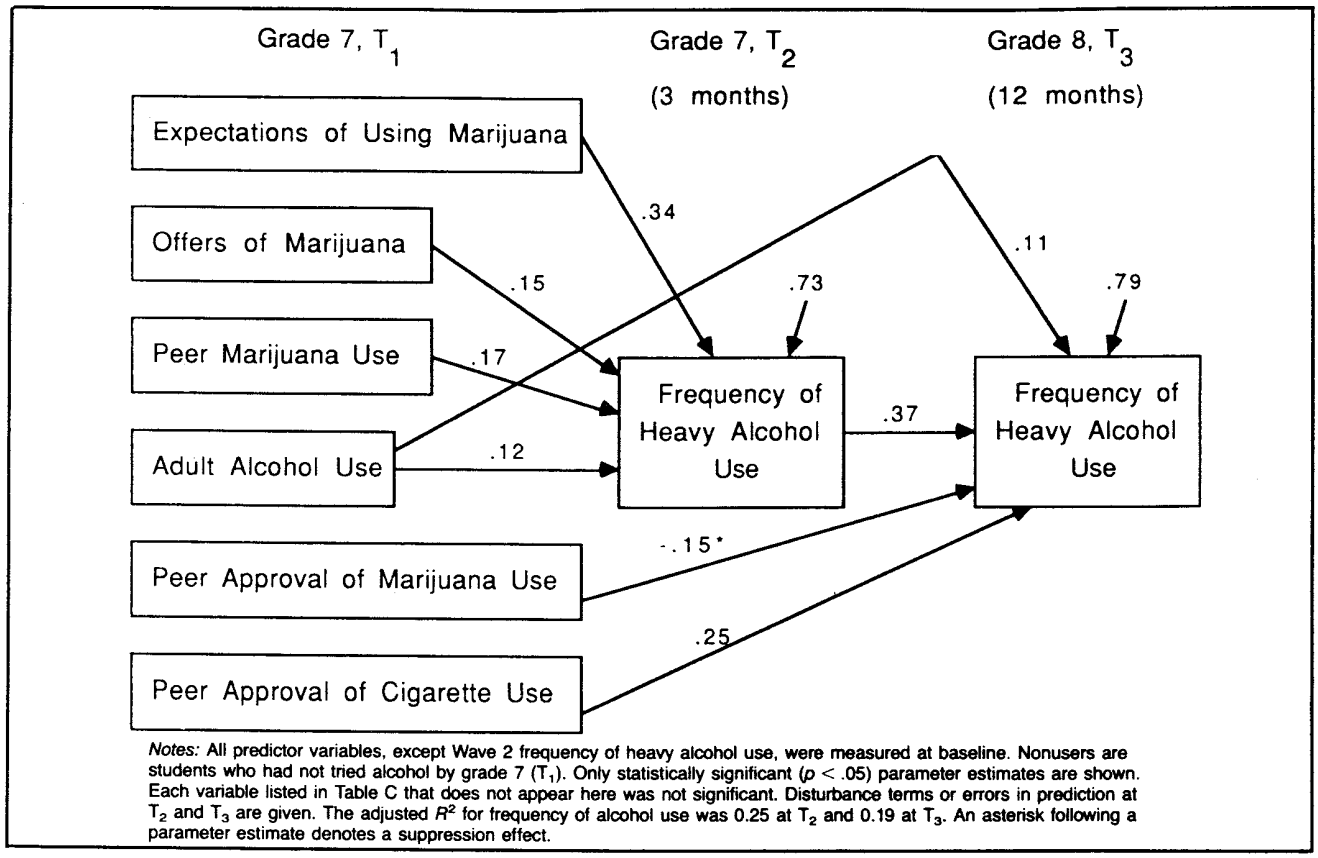

FIGURE 3. Future heavy drinking among 7th-grade nonusers: Standardized regression effects of variables predicting frequency in the last month.

drinking patterns at baseline, they constitute the most powerful predictors of heavy use after 3 months, a pattern we also saw for continued current use within this group.

Social influences also promote early binge drinking among these young initiates, but they reflect exposure to a broader drug culture as well as an environment in which alcohol is socially acceptable and available. Seventh graders whose parents, friends and acquaintances drink and who receive offers of both alcohol and marijuana are more likely to start heavy drinking within a short (3 months) time period. If they also expect to use marijuana within the next 6 months, the transition to proximal heavy use is further accelerated.

More distal binge drinking among baseline users is primarily affected by prior alcohol use, particularly heavy drinking 9 months earlier. Problem behaviors that had emerged a year earlier—deviance and poor academic performance—also play a role, as does the cognitive factor, expectations of future drinking. In contrast, prior social influences linked to alcohol recede as important predictors of later binge drinking: neither parental drinking nor alcohol use among the initiate's 7th-grade peers has significant effects on heavy use in grade 8, nor has greater availability of alcohol during grade 7. On the other hand, 7th graders with more opportunities to obtain marijuana are more likely to drink to excess a year later—a result that is consistent with data showing prior marijuana use to be a stage of use preceding "problem" drinking (Donovan and Jessor, 1983).

Discussion

This study clarifies the alternative paths to alcohol involvement among young adolescents with different histories of prior use. It also points out the differential impact of social, cognitive and behavioral factors on how often adolescents drink compared to how often they drink to excess. Each has important implications for the likely effectiveness of alcohol prevention programs.

How antecedents vary for adolescents with and those without prior alcohol experience

The social influence prevention model is based on the notion that adolescent drug use is largely a social phenomenon, a response to pro-drug messages and models of

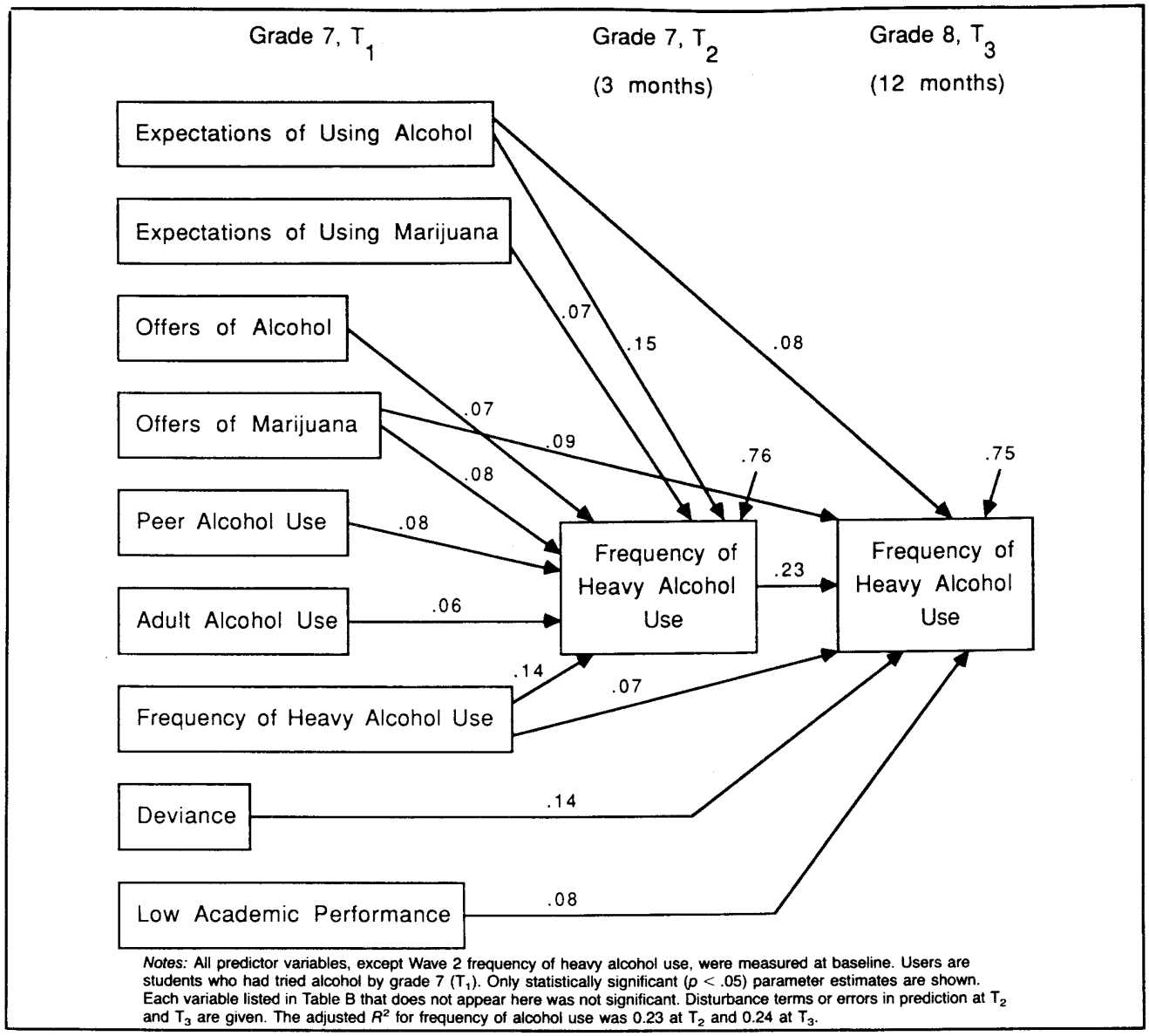

FIGURE 4. Future heavy drinking among 7th-grade users: Standardized regression effects of variables predicting frequency in the last month.

drug use presented by peers, adults and the media. The commonality among alcohol, cigarette and marijuana use suggests that social influences may operate similarly for these substances and that there may be interplay across them (Ellickson and Hays, 1990).

Our results highlight these environmental factors as the major, indeed the only, influence on proximal involvement with alcohol—at least for adolescents who had not tried alcohol by the middle of grade 7. While parents who drink have somewhat greater impact on initial involvement than do drinking peers, exposure to peers who use marijuana outweighs both of these influences as a predictor of alcohol onset for this group. Hence programs that seek to retard alcohol initiation may benefit by helping young people resist pressures to use both alcohol and marijuana.

The findings also suggest that such programs should help young people counter familial, as well as peer, influences on drinking behavior. Adult role models are particularly important for shaping initial alcohol use during grade 7, while parental tolerance of their offspring's drinking is only slightly less important than peer approval in fostering current drinking during grade 8. Both adult and peer drinking promote increased frequency of use among 7th graders with prior experience, with peer role models assuming slightly greater importance.

TABLE 1. Percentage of students with various characteristics in baseline and analysis samples, in percent

	Baseline sample	Analysis sample
Female	48.2	50.7*
White	66.3	71.3*
Hispanic	11.6	9.1*
Black	11.1	8.8*
Asian	6.7	8.1*
Native American/mixed	2.2	2.3
Low grades (C or lower)	36.3	30.8*
High deviance	48.2	44.3*
Father not a high school graduate	18.7	15.2*
Not living with both natural parents	42.5	37.5*
Ever used cigarettes	54.4	51.2*
Ever used alcohol	77.3	76.6
Ever used marijuana	23.8	18.4*

Note: All data are based on self-reports from baseline.
*Analysis sample and those excluded differ significantly from one another ($p < .01$).

TABLE 2. Correlations between peer use and alcohol use

	Frequency of use			Binge drinking		
	W3	W2	W1	W3	W2	W1
BASELINE NONUSERS						
Peer use						
Wave 3	0.59*	0.28*	–	0.50*	0.27*	–
Wave 2	0.32*	0.58*	–	0.15*	0.41*	–
Wave 1	0.11	0.09	–	0.06	0.22*	–
BASELINE USERS						
Peer use						
Wave 3	0.58*	0.44*	0.33*	0.47*	0.39*	0.18*
Wave 2	0.47*	0.53*	0.40*	0.38*	0.42*	0.25*
Wave 1	0.41*	0.43*	0.52*	0.32*	0.38*	0.34*

Note: Dash indicates that entry is not applicable to Wave 1 nonusers.
*$p < .05$.

While the overall picture is one in which peer factors slightly outweigh parental influences in prompting increased frequency of use after initiation, having friends who drink or being offered alcohol in grade 7 does not necessarily affect drinking in grade 8. For these young adolescents, friendships are likely to change rapidly, thereby diluting the long-term effects of previous relationships. As Table 2 shows, exposure to peers who drink at later waves tended to be more highly associated with 8th-grade alcohol use than was perceived exposure at Wave 1. This was particularly true for the baseline nonusers.

The results of this study clearly indicate that cognitive factors affect future alcohol use only *after* young adolescents have begun to drink. As Tables B and C in the Appendix show, perceptions based on experience are also more stable over time; hence expectations of future use, as well as beliefs about the consequences of drinking, reflect more concrete orientations among users compared to nonusers. Because more stable beliefs would presumably be more resistant to modification, these findings pose a challenge for prevention programs aimed at altering perceptions about alcohol. Nevertheless, the payoff for success could be important, particularly when we realize that believing alcohol use can be harmful to "kids their age" helps shield teenagers from increased alcohol use for as long as a year.

The dominant effect of prior alcohol use on future drinking underlines the importance of early alcohol prevention efforts. About three-fourths of our sample had tried alcohol by the middle of the 7th grade, a sobering (no pun intended) statistic. If this picture holds up outside California and Oregon, preventing or even delaying alcohol onset may have been precluded by age 12 1/2 for the great majority of young people; achieving these goals, if feasible at all, requires targeting alcohol prevention at children in grade 6 or earlier. Later efforts to curb continued alcohol use may also be impeded if early alcohol use habits have become ingrained.

Variations in antecedent effects on different alcohol use measures

Although one might expect students who remain nondrinkers through the transition to junior high to lag behind the initiates in increasing their drinking, that is not necessarily the case. For some of these students, involvement in a subculture of marijuana use appears to substitute for exposure to alcohol as a stimulant to both early involvement and heavy drinking. Former nonusers who engage in binge drinking within 3 months are clearly on a fast track: Their accelerated passage through the typical substance use sequence—from alcohol to marijuana to more problematic drinking—is propelled by exposure to marijuana users and further enhanced by parental drinking. Involvement in a marijuana subculture also promotes early binge drinking among those who had tried alcohol by grade 7. Even more distal drinking—current or heavy drinking during grade 8—is predicted by early exposure to marijuana among baseline alcohol users: Those who had initiated marijuana use by grade 7 tend to drink more frequently in grade 8; those who were offered marijuana a year ago are more likely to engage in heavy drinking a year later.

Hence combating social influences to use marijuana may retard increased involvement with alcohol, as well as initial use. The same argument applies to cigarettes. Early exposure to an environment that fosters smoking promotes increased frequency of drinking and heavy drinking a year later: Children who received more offers of a cigarette in the 7th grade are likely to drink more frequently in grade 8; those whose peers approve of smoking are more likely to become heavy drinkers a year later. Accordingly, prevention programs that target social antecedents of both legal and illegal substances may have spillover effects in both directions—on use of substances like alcohol that come early in the use sequence and on those like marijuana or cocaine that come later. Our research suggests

that one can teach adolescents how to resist one or more of the commonly used drugs (alcohol, cigarettes and marijuana) with a reasonable expectation that their enhanced resistance skills will generalize to other substances (Hays and Ellickson, 1990).

We should note, however, that binge drinking is also fostered by other attributes (deviant behavior and poor academic performance) that are particularly resistant to short-term improvement programs. Therefore, curbing alcohol abuse may require efforts that can concentrate resources for more extended periods on particular student groups (e.g., those who are doing poorly in school or have engaged in deviant activities like stealing).

The results of this study make clear that the paths to alcohol use and abuse are complex. Social influences play a substantial role, extending beyond exposure to pro-alcohol messages and role models who drink to include immersion in a broader drug culture that promotes cigarette and marijuana use. Beliefs about the consequences of using alcohol and expectations of future drinking appear to affect later use only after the child has started to drink (and thus has concrete experience on which to base those cognitions). Similarly, prior deviant behavior and lower academic achievement foster subsequent frequency of alcohol use and heavy drinking, but not alcohol onset.

Reducing alcohol use among adolescents requires, therefore, a multipronged effort aimed at multiple risk factors. Programs that target a single risk factor, such as self-esteem or poor school achievement, are unlikely to have a significant impact. Indeed, we found no correspondence between self-esteem and the onset of alcohol use, its continuation, or heavy drinking among these 12 and 13 year olds, a result that is consistent with other multivariate research (e.g., Hays et al., 1986). To have an impact on adolescent drinking rates and levels of involvement, prevention programs need to address social, cognitive and behavioral antecedents of alcohol use.

Appendix

TABLE A. Psychosocial and behavioral concepts in project ALERT surveys

PERSONALITY CONCEPTS

Expectations of using drugs
- Do you think you will drink any alcohol (cigarettes, marijuana) in the next six months?

Beliefs about harm from alcohol use
- How much do you think kids your age might harm themselves if they drink alcohol occasionally?

Alcohol use resistance self-efficacy
- What if your date offered you a beer and you did not want it. What would you do?
- If all my friends were drinking alcohol I would find it pretty hard not to drink, too.

Self-esteem
- At times I think I am no good at all.
- Other kids seem happier than I am.

TABLE A (*continued*)

SOCIAL INFLUENCE CONCEPTS

Offers of drugs
- How many times have you been offered any alcohol (cigarettes, marijuana)?

Perceived peer, adult and sibling drug use
- How often are you with kids who are drinking alcohol?
- Do you think your best friend drinks alcohol sometimes?
- How often does the adult that is most important to you drink alcohol (smoke cigarettes, use marijuana)?
- Do any of your older brothers or sisters drink alcohol (smoke cigarettes, use marijuana) sometimes?

Perceived peer and parental approval of drug use
- If your friends found out that you drink alcohol (smoke cigarettes, use marijuana) sometimes, how do you think they'd feel?
- How would your parents feel if they found out you drink alcohol (smoke cigarettes, use marijuana) sometimes?

Perceived respect for not using drugs
- Kids actually respect you more if you refuse to smoke cigarettes.
- Kids actually respect you more if you refuse to use marijuana.

BEHAVIORAL CONCEPTS

Deviance
- In the past year, how often have you done each of the following things?: Skipped school without a good excuse? Cheated on a test? Taken something from a store that did not belong to you? Been sent out of the classroom for causing trouble?

Academic performance/orientation
- What grades do you get in school?
- What is the highest level of school you plan to finish?

School absences
- About how many days have you been absent since you came back to school?

Alcohol, cigarette and marijuana use
- On how many days did you have any alcohol in the last month (30 days)?
- On how many days in the last month (30 days) did you have three or more alcoholic drinks?
- On how many days did you smoke a cigarette in the last month (30 days)?
- On how many days did you use marijuana in the last month (30 days)?

TABLE B. Test-retest correlations for psychosocial and alcohol use variables: Users

	n of items	Test-retest interval (mos.) 3	9	12
PERSONALITY		W1–2	W2–3	W1–3
Intentions				
Alcohol	1	.63	.59	.45
Cigarettes	1	.60	.57	.48
Marijuana	1	.70	.57	.50
Beliefs about harm	1	.43	.46	.35
Resistance self-efficacy	2	.56	.55	.40
Self-esteem	2	–	–	.33
ENVIRONMENT				
Offers				
Alcohol	1	.59	.59	.47
Cigarettes	1	.68	.63	.52
Marijuana	1	.76	.65	.57
Peer use				
Alcohol	2	.57	.56	.42
Cigarettes	2	.63	.57	.48
Marijuana	2	.66	.58	.52
Adult use				
Alcohol	1	.57	–	–

TABLE B (*continued*)

Cigarettes	1	.76	–	–
Marijuana	1	.62	–	–
Sibling use				
Alcohol	1	.69	.68	.62
Cigarettes	1	.77	.73	.67
Marijuana	1	.71	.62	.55
Peer approval				
Alcohol	1	.50	.50	.38
Cigarettes	1	.54	.49	.40
Marijuana	1	.60	.54	.48
Parental approval				
Alcohol	1	–	–	.38
Cigarettes	1	–	–	.41
Marijuana	1	–	–	.41
Perceived respect for not using drugs	2	.39	.38	.30
Behavior				
Frequency of last month use				
Alcohol	1	.46	.44	.33
Cigarettes	1	.57	.50	.47
Marijuana	1	.62	.44	.35
Binge drinking	1	.33	.37	.25
Deviance	4	.66	.60	.53
School absences	1	–	–	–
Academic performance/ orientation	2	.70	–	–

Note: Three-month test-retest values are for Waves 1–2; 9-month interval is for Waves 2–3; 12-month gap is for Waves 1–3. Dash indicates that the variable was not measured at both time points.

TABLE C. Test-retest correlations for psychosocial and alcohol use variables: Nonusers

	n of items	Test-retest intervals (mos.) 3	9	12
Personality		1–2	2–3	1–3
Intentions				
Alcohol	1	.35	.42	.24
Cigarettes	1	.53	.46	.31
Marijuana	1	.52	.46	.20
Beliefs about harm	1	.53	.34	.20
Resistance self-efficacy	2	.44	.42	.23
Self-esteem	2	–	–	.39
Environment				
Offers				
Alcohol	1	.37	.48	.37
Cigarettes	1	.67	.65	.51
Marijuana	1	.45	.54	.36
Peer use				
Alcohol	2	.45	.46	.32
Cigarettes	2	.55	.45	.31
Marijuana	2	.60	.61	.49
Adult use				
Alcohol	1	.53	–	–
Cigarettes	1	.71	–	–
Marijuana	1	.36	–	–
Sibling use				
Alcohol	1	.48	.52	.52
Cigarettes	1	.64	.60	.72
Marijuana	1	.34	.51	.40
Peer approval				
Alcohol	1	.42	.37	.31
Cigarettes	1	.55	.37	.34
Marijuana	1	.44	.46	.33
Parental approval				
Alcohol	1	–	–	.24
Cigarettes	1	–	–	.42
Marijuana	1	–	–	.13
Perceived respect for not using drugs	2	.34	.31	.30
Behavior				
Frequency of last month use				
Alcohol	1	NA	.34	NA
Cigarettes	1	.47	.59	.40
Marijuana	1	.65	.40	.31
Binge drinking	1	NA	.27	NA
Deviance	4	.54	.45	.44
School absences	1	–	–	–
Academic performance/ orientation	2	.77	–	–

Note: Three-month test-retest values are for Waves 1–2; 9-month interval is for Waves 2–3; 12-month gap is for Waves 1–3. Dash indicates that the variable was not measured at both time points. NA = not applicable.

Notes

1. We refer to this measure interchangeably as heavy alcohol use, binge drinking, or excessive use. While adult studies commonly define binge drinking as five or more drinks in a row, applying that criterion to young adolescents is inappropriate. We chose three or more drinks as a more likely indicator of intoxication for this age group.
2. For example, latent variable structural equation modeling (SEM) is more appropriate for testing well-specified theories encompassed by relatively few variables. While SEM permits the simultaneous estimation of direct and indirect effects on dependent variables (Kerwin et al., 1987), its use is most appropriate when the interrelationships among all variables (direct and indirect effects and correlations) can be precisely specified and when the number of theoretically relevant variables does not exceed limitations of available software.
3. Efforts to minimize respondent loss included tracking movers and conducting make-up data collection sessions (Ellickson, 1989; Ellickson et al., 1988b). The 40% decrease in sample size breaks down as follows: movers (8%), absentees (11%), refusals (2%) and missing data for the variables included in the analysis (19%). Despite this loss, the change in composition between the original and analysis samples averaged only about three percentage points (see Table 1).
4. Because prior use is typically the most important predictor of subsequent drinking patterns, failure to control for intervening alcohol use risks overstating the importance of cognitive and environmental factors.
5. The negative impact of peer approval of alcohol use is a suppression effect; the zero-order relationship is not significantly different from zero.
6. The zero-order correlation between peer alcohol use and distal use by the student was $r = -.04$, perhaps reflecting a change in adolescent friendships in the intervening 12 months.

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