

Risk and Protective Factors as Predictors of Adolescent Alcohol Involvement and Transitions in Alcohol Use: A Prospective Analysis*

LAWRENCE M. SCHEIER, PH.D., GILBERT J. BOTVIN, PH.D., AND ELI BAKER, PH.D.

Department of Public Health, Institute for Prevention Research, Cornell University Medical College, 411 East 69th Street, Kips Bay 201, New York, N.Y. 10021

ABSTRACT. *Objective:* Determinants of initial alcohol use may differ from predictors of accelerated or problematic consumption. Social influences may be strong predictors of initial drinking; however, later stages of problem drinking may be linked developmentally to intrapersonal deficits. This study prospectively examined the influence of chronic and changing risk and protective status in predicting adolescent alcohol involvement and transitions in alcohol use. *Method:* Data were obtained from a three-wave cohort ($N = 823$) of 8th-10th grade nonintervention students participating in a school-based drug abuse prevention trial. Cognitive, attitudinal and social influence measures were dichotomized using empirical cut-offs to designate risk or protective status. Using a conceptually based assignment scheme, additive risk indices were created assessing chronic (averaging across time) and changing features of competence, psychological and interpersonal functioning, cognitive-affective and social influences. Three chronic and change protective indices were created tapping competence, psychological, and interpersonal functioning. *Results:* Controlling for initial drink-

ing and gender, chronic risk for social influence and psychological functioning and increased risk for social influences and competency predicted subsequent drinking behavior. Chronic psychological protection attenuated subsequent drinking. Using categorical measures of drinking behavior to designate nonuse, experimental or moderate-heavy use, chronic social influence and competency risk were associated with an increased likelihood of accelerated drinking, whereas improved psychological functioning diminished the likelihood of increased drinking behavior. *Conclusions:* Findings underscore the need for implementing prevention strategies that reinforce developmentally appropriate skills and enhance personal competence and psychological functioning as effective barriers against initial and more problematic alcohol use. The unique contribution of protective forces also underscores that risk reduction and protection enhancement are complementary processes and are both required to offset social influences for alcohol consumption. (*J. Stud. Alcohol* 58: 652-667, 1997)

A WIDE RANGE of risk and protective factors have been implicated as predictors of adolescent alcohol involvement. In the past two decades alone, researchers have gathered a sufficient body of knowledge to effectively inform prevention regarding the processes by which many of these risk and protective factors operate (Hawkins et al., 1992). Much of this research underscores that social learning factors (e.g., peer and adult models and normative expectations) are key determinants in the initial stages of adolescent alcohol use (Brook and Brook, 1988; Graham et al., 1991; Hansen et al., 1987; Huba and Bentler, 1984). Based on important theoretical considerations (Bandura, 1977, 1986; Jessor and Jessor, 1977) and the strength of empirical findings, numerous school-based drug abuse prevention programs have adopted a core strategy that includes correcting misperceptions regarding normative expectations, teaching alcohol and other drug refusal skills, and imparting social and related competency skills that can serve as effective barriers against

experimental drug and alcohol use (Botvin and Botvin, 1992; Hansen et al., 1988; Pentz, 1985).

Evidence for differential etiology of alcohol use and abuse

In recent years, however, several converging lines of evidence suggest that the etiology of alcohol use is a complex phenomenon and that social influences are a necessary but not sufficient condition for explaining degree of alcohol involvement. In particular, evidence has accumulated that underscores the need to distinguish between predictors of early-stage alcohol use and more protracted or elevated levels of alcohol use (e.g., Clayton, 1992; Newcomb and Bentler, 1989). In fact, a consensus among empirical studies suggests that "the factors that cause the initial onset of a behavior may be quite different from those that maintain the behavior or result from the behavior" (Chassin et al., 1985, p. 614). For instance, in contrast to most survey-based research, findings from clinical and treatment studies emphasize deficits in intrapsychic functioning (i.e., problems in living, depression, anxiety, poor social skills, lack of personal competence, and chronic problems at home and in school) as essential conditions that lead to alcohol use (Cox, 1985; Donovan, 1986;

Received: March 29, 1996. Revision: July 30, 1996.

*Preparation of this article was partially supported by a research grant to Gilbert J. Botvin (P50-DA7656) and a FIRST Award to the first author (R29-DA08909-01) from the National Institute on Drug Abuse.

Miller, 1990; Needle et al., 1988; Pogge and Harvey, 1992; Van Hasselt et al., 1993).

In addition to clinical evidence, data from nationwide surveys reinforce that not all youth drink excessively, despite the fact that more and more youth report having tried alcohol (Johnston et al., 1996). Despite historical trends that show declines in annual prevalence for many categories of substance use (i.e., alcohol, marijuana, cocaine), recent statistics reveal that greater numbers of youth transition from experimental drinking stages to more abusive patterns in a relatively short period of time. In the past few years alone, prevalence estimates for 8th and 10th graders' self-reported drunkenness have doubled (18.2% compared to 38% for annual and 8.7% and 20.3% for 30-day prevalence, respectively). Comparative statistics also reveal that in comparing the 8th and 10th grade cohorts, prevalence estimates for heavy drinking, defined as five or more drinks per occasion in the past 2-week period, also increased substantially (14.5% vs 23.6%, respectively). Thus, in a very short time-span, some youth transition from early experimental drinking to more exacerbated levels of alcohol use. Adolescence is the formative years for the development of skills related to adult functioning; however, it is also the period in which most youth initially experiment with alcohol and other drugs (Kandel, 1980; Newcomb and Bentler, 1986). Delay in the acquisition of these skills and related competencies through abusive drinking practices can have untoward negative effects in later years (Kandel et al., 1986).

Differential etiology coupled with divergent drinking practices among a subset of the general population underscore a large gap in our current understanding of the precise mechanisms that foster movement from the early stages of alcohol use to problematic drinking. In this study, we examine the ability of various dimensions of risk and protection (i.e., social influences, cognitive-affective motivations, personal and social competence, and psychological functioning), and their changing status over time, to predict both alcohol involvement and transitions in alcohol use. Data were obtained from a cohort of nonintervention control students participating in a prospective, school-based, drug prevention study. Prior to reporting the findings of this study, we provide a brief overview of community-based studies that underscore the need for differential etiological models of experimental versus more problematic alcohol use.

Evidence for differential etiology based on general population studies

Cross-sectional and longitudinal studies of adolescent alcohol and other drug use have largely reinforced that, in addition to social influences, personality and related facets of intrapersonal functioning also predict consumption and drinking-related problems (e.g., Bates and Pandina, 1989; Labouvie and McGee, 1986; Stein et al., 1987; Wingard et al., 1980). Stacy and associates (1991), for example, have

shown that adolescent personality factors are good predictors of excessive alcohol use in young adulthood and are strong predictors of serious complications from drinking (driving and work-related problems). Key personality dimensions in their longitudinal model included social conformity (e.g., law abidance), sensation seeking and hostility, all of which had both direct and indirect effects on consumption patterns and drinking problems (see also Johnson and White, 1989, for linkages between personality characteristics and driving while intoxicated among young adults).

Studies of college-aged youth indicate that expectancies (motivations) and internal coping processes are key ingredients in the decision to drink alcohol (Cooper et al., 1988, 1995). Carey (1995), working with college-aged youth, and Brown et al. (1987) (see also Christiansen and Goldman, 1983), working with adolescent samples, have shown that expectancies (internal motivational cues, which may be influenced by interpersonal processes) are good predictors of later drinking behavior and intoxication. These and other studies that have collectively examined cognitive motivations for drinking report that both adolescents and young adults drink alcohol as a form of coping with stress and negative affect (e.g., Colder and Chassin, 1993; Cooper et al., 1988; Labouvie, 1986; Wills, 1986), and that increased involvement with alcohol is predicated on poor coping strategies and high levels of affective stress. In addition to key personality factors, Pandina and colleagues (1990) have shown that continued or escalated alcohol and other drug use (i.e., marijuana) is also strongly linked to deficits in perceived competence, the latter which can be both antecedents to and consequences of persistent alcohol and drug use (Scheier and Botvin, 1995).

The work of Weber et al. (1989) with alcohol involvement and Simcha-Fagan et al. (1986) and Scheier and Newcomb (1991) with drug use (including alcohol) have all underscored the need to distinguish etiological pathways for substance use and abuse.¹ Based on 2-year longitudinal data, Scheier and Newcomb (1991) demonstrated that predictors of initiation to alcohol and other drugs (i.e., marijuana), including peer and friendship bonding, academic performance, and perceived school climate, are distinct from predictors of a more problematic level of drug use, the latter of which included distress, locus of control, attitudes toward drugs and measures of social influence (e.g., perceived peer use). The research of Simcha-Fagan et al. (1986) suggests that etiological factors that predict initiation and more extreme patterns of drug use may differ and that it remains an important goal of etiology research to discern these processes. This position is based, in part, on the fact that in many etiology studies, variances accounted for in the drug use criterion are substantially larger with concurrent prediction than with longitudinal prediction. Accordingly, this temporal shrinkage (or erosion) may be attributed to changing sets of risk conditions related to escalation in drug use. Effective tests of this hypothesis would include discerning whether one set of risk factors that predict

initial stages of alcohol use (i.e., social influences) also efficiently predict higher levels of alcohol involvement.

Perhaps the most compelling evidence for differential alcohol etiology has been the work of Weber et al. (1989). Their research has shown that problem prone adolescents accelerate their alcohol involvement more rapidly than normal socialized adolescents, who also drink but at a much lower rate. Problem prone youth were characterized by low parental concern with drug/alcohol use, low parental anger toward the focal youths drug/alcohol use, few perceived negative consequences of alcohol use, high perceived peer alcohol use and high perceived availability. Based on their data, Weber et al. concluded that alcohol use onset is best conceptualized as "being a multiple pathway process having at least two paths; one followed by normally socialized adolescents and the other followed by problem behavior prone adolescents" (1989, p. 405). In sum, these and related studies have provided substantial empirical evidence underscoring the need to conceptualize divergent etiological pathways with peer models promoting initial use, and deficits in intrapersonal functioning leading to more protracted levels of use.

Transitions in risk and protection as determinants of use and abuse

In addition to concerns regarding differential etiology, recent research trials, using a multiple risk factors approach, have provided compelling evidence that the cumulative and interdependent nature of risk provides a useful predictive framework from which to understand the mechanisms that foster initial (experimental) use and more problematic use (Bry et al., 1982; Newcomb et al., 1986b; Scheier and Newcomb, 1991). According to this view, no single best predictor will account for variation in substance use, but, rather, cumulative amounts of risk (and, conversely, protection, which is hypothesized to diminish drug use) are more likely to instigate behavioral change.

Although empirical studies that have applied a risk factors methodology to the prediction of adolescent alcohol and drug use have provided promising findings, research of this nature is at a very early stage of conception and many questions with regard to the significance of this approach remain. First, despite the ability to capture multiple facets of risk in a single index, risk may not be a "static" force, exerting a constant effect on behavior, but rather better conceptualized as a dynamic set of conditions that collectively influence behavior (e.g., Rutter, 1990). Consider, for example, that during the initial stages of alcohol use, risk associated with social influences may change as a function of peer models for drinking. One set of peer models may be active during the experimental stage of drinking; however, as either conditions of risk or behavior involvement exacerbate, a different and more deviant-prone set of peers may actively reinforce excessive alcohol use. Proponents of self-derogation theory (Kaplan, 1980; Kaplan et al., 1984) suggest that deviant peer

groups serve an instrumental coping function and, despite their unconventional and lowered social status, functionally serve to bolster self-esteem.

Second, in addition to increased susceptibility attributed to change in risk status, some youth may experience the beneficial effects of protective factors, which may offset the negative effects of risk. Recent studies have confirmed empirically that protective influences make a unique contribution to the prediction of multiple types of drug use (including alcohol and drunkenness), controlling for levels of psychosocial risk (Newcomb and Felix-Ortiz, 1992; Scheier et al., 1994). In these studies, protection was conceptualized as distinct from risk (as opposed to opposite ends of the same continuum), and in the study by Newcomb and Felix-Ortiz protection moderated the relations between risk and alcohol and drug use. Although these studies have yielded promising findings, differences in conceptualization of the protective factors, a wide range of substance use outcome measures (i.e., alcohol, marijuana, cocaine and other hard drugs) and implementation of different analytic strategies underscore the need for continued research using this approach.

Focus of the current study

The current study addresses a number of methodological and conceptual issues raised by previous etiological studies. First, in contrast to previous research, which used at most one (Bry et al., 1982; Newcomb et al., 1986) or two multiple-factor indices of risk (Scheier and Newcomb, 1991) and/or protection (Scheier et al., 1994), we include a wider range of risk and protective indices assessing social (e.g., assertiveness) and personal competence (e.g., decision-making skills), psychological functioning (e.g., depressive symptoms), social influences (e.g., perceived peer use) and relevant features of resilience (e.g., functional coping resources). Based on current theory and empirical findings (Petraitis et al., 1995), individual risk and protective factors were organized into conceptually meaningful clusters (i.e., additive indices), which are then modeled as unique predictors of alcohol use (the methodology for the creation of risk and protective indices is clarified below).

Second, we address three important research questions specific to developmental change. A first research question regards the ability of social influences to predict both initial drinking behavior and increased alcohol involvement (i.e., problem use), controlling for various facets of intrapersonal risk the latter of which has been shown to be a prominent predictor of more problematic alcohol use. By modeling both social and intrapersonal risk in a single model and using hierarchical regression methods, we can observe the relative change in the unique regression weights following introduction of a new set of risk (or protective) factors. Coupled with the ability to distinguish the relative predictive prominence of a diverse set of risk and protective factors is our reliance on longitudinal data, which enables us to ascertain the rela-

tive durability of these predictors over time. Social influences may be good predictors of the early stages of alcohol consumption but not maintain their relative saliency over time with increasing levels of alcohol involvement.

A second research question related to developmental change concerns the predictive ability of changing conditions of risk and protection to account for variation in alcohol consumption. For these analyses, a measure of average or cumulative risk is created (averaging 8th and 10th grade scores) for each of the distinct risk/protective indices. These scores reflect the "chronicity" of risk (and protection) over time and these average scores are then used to predict subsequent alcohol involvement. According to Labouvie and associates (1991), "the use of time-averaged scores is consistent with the notion that the impact of a risk variable on the target outcome is mediated by a cumulative process" (p. 313). Chronic risk/protection is only one factor that may instigate behavioral change; another factor might be developmental change. To capture change in risk and protective status over time, difference scores encompassing the 3-year lag between assessments were created and their effects estimated in concert (using hierarchical regression methods) with chronic features of risk/protection. In this respect, difference scores capture the changing component of risk as individuals shift their position in the distribution from baseline to follow-up and should be statistically unrelated to chronic scores, the latter which reflect consistent or stable characteristics. When difference scores are entered into the regression model subsequent to the inclusion of chronic scores, significant regression weights associated with difference scores indicate that decrements in performance increase alcohol consumption, whereas increases in protection attenuate consumption.

To address a third and final research question, we extend the model of general alcohol involvement to include a measure of transitional alcohol use (specifically capturing accelerated movement from low levels of use to higher levels of use between 8th and 10th grade) and, using hierarchical logistic regression methods, estimate the effects of risk and protective factors on changing alcohol patterns over the same 3-year period. Based on self-reported frequency of alcohol use, we limited the sample to those youth who remained consistent in their drinking behavior (maintenance) and those youth who increased their frequency over the 3-year period.

Method

Participants

This study was part of a longitudinal, school-based, drug prevention program implemented between 1985 and 1991 and conducted primarily in three geographical areas of the eastern United States, representing urban, suburban and rural populations (for a comprehensive description of the program and its prevention findings, see Botvin et al., 1990, 1995). A total of 56 middle and junior high schools participated, with one-third

of the schools designated as controls (there were two experimental conditions). A closed-ended, self-administered questionnaire was administered by trained field personnel during a 1-hour classroom session. Items included in the survey assessed a variety of attitudes, intentions and behaviors related to alcohol, cigarette and marijuana use. Students' responses were strictly confidential and longitudinal tracking was tied to unique identification numbers lithocoded on each form. The panel design used in the current study relies upon two assessment points corresponding to 8th and 10th grade.²

The sample includes only control students as an effective means of minimizing biases attributable to intervention effects (these effects were quite substantial and the inclusion of experimental students would bias parameter estimation). The sample was predominantly white (91%) and middle class, contained approximately equal numbers of males and females, a majority of the students resided with intact families, and a majority of parents were educated beyond high school. These characteristics remained stable over the course of the study, reinforcing that attrition had little effect on the sociodemographic composition of the sample (attrition is discussed in greater detail below).

At the outset of the project, the psychosocial measures were selected from a rich vein of clinical and developmental literatures with the aim of assessing important facets of psychosocial functioning related to personal competence (e.g., decision-making skills and self-esteem), behavioral control (task persistence) and social anxiety (e.g., social concern and assertiveness), just to name a few. The final selection of items and their respective summary scales for inclusion in the prevention trial was conducted following extensive factor analytic work and reviews of the literature. Criteria for inclusion in the parent study health questionnaire included selecting the top loading items from exploratory factor analyses (Botvin et al., 1990, have demonstrated the psychometric adequacy of these modified scales utilizing principal component with both oblique [oblimin] and orthogonal [varimax] rotated solutions) and establishing the psychometric properties of these modified scales. More recently, Botvin (1993) and Scheier and Botvin (1995) have utilized confirmatory factor analytic methods to provide internal consistency estimates for the psychosocial scales. Table 1 presents Cronbach alpha reliability estimates for the multi-item psychosocial scales and includes their sources and sample items. Multi-item scales were reasonably internally consistent and ranged from a low of .60 for locus of control to .91 for decision-making skills in the 8th grade and .61 for locus of control to .92 for decision-making skills at follow-up (average scale internal consistency in the 8th grade was .79 and increased to .81 at follow-up).

Additional measures incorporated in the additive indices and that are not mentioned in Table 1 include the perceived social influence measures, antisocial behavior, alcohol knowledge and grade point average. The social influence measures included perceived friends' alcohol use ("How

TABLE 1. Reliabilities, sample items and sources for measures used in longitudinal analyses

Psychosocial domain and specific measure	Sample item	Time 3 (8th Grade) ∞	Time 5 (10th Grade) ∞	Principal source
Competence				
Decision-making skills (7)	"When I have a problem I get the information needed to make the best choice."	.91	.92	Wills (1986)
Self-management skills (8)	"When I realize that I cannot help but be late for an important class, I tell myself to keep calm"	.81	.83	Rosenbaum (1980)
Academic esteem (6)	"I sometimes feel that teachers are picking on me"	.66	.63	Fleming and Watts (1980)
Psychological functioning				
Behavioral control (10) (i.e., task persistence)	"If something is really difficult, I get frustrated and quit"	.80	.80	Kendall and Wilcox (1979)
Depressive/anxious symptoms (12)	"During the past month I felt restless, fidgety, or impatient"	.88	.88	Veit and Ware (1983)
Locus of control (5)	"I do not believe that chance or luck plays an important role in my life"	.60	.61	Rotter (1966)
Self-esteem (10)	"I feel that I have a number of good qualities"	.86	.86	Rosenberg (1965)
Interpersonal functioning				
Social concern (8)	"I find it hard to start a conversation when I meet new people"	.83	.86	Fleming and Courtney (1984)
Perceived adult support (5)	"When something bothers me or I feel upset I talk with a teacher"	.73	.73	Wills (1986)
Perceived functional support (4)	"When something bothers me or I feel upset I find someone special to share my problem with"	.87	.89	Wills (1986)
Social anxiety (4)	"How nervous would you feel if you tell someone who is embarrassing you to stop"	.75	.81	Richardson and Tasto (1976)
Assertiveness (18)	"How often do you start a conversation with someone you don't know?"	.74	.79	Gambrill and Richey (1975)
Cognitive-affective influences				
Alcohol expectancies (10)	"Drinking alcohol lets you have more fun"	.86	.87	Botvin et al. (1990)

Notes: Numbers in parentheses reflect the number of items in the scale. Reliabilities were computed using Cronbach's alpha estimate of reliability. Items not included in the table, but used in the longitudinal model (social influence measures, alcohol knowledge, antisocial behavior and grades), are fully described in text.

many of your friends drink alcohol?"), friends' attitudes toward alcohol use ("How do your friends feel about whether or not you drink?"), parents' attitudes toward alcohol use ("How do your parents feel about whether or not you drink?"), perceived peer norms ("In your opinion, how many people your age drink alcoholic beverages?") and adult norms for alcohol use ("In your opinion, how many adults drink alcoholic beverages?"). Scales for the perceived use items ranged from "none" (1) to "all or nearly all" (5); for the attitudinal items ranged from "strongly against it" (1) to "strongly in favor of it" (6); and for the normative use items ranged from "none" (1) to "almost all" (6).

Self-reported grades were assessed on a seven-point scale ranging from "D's or lower" (1) through "mostly A's" (7) (numeric ranges were provided alongside each grade option to convert to a 100-point scale). Antisocial behavior consisted of five dichotomously scored questions ("yes/no") asking respondents if they had ever gotten into trouble with parents, at school, with the police, gotten into a fight or had an accident while they were drinking or drunk. The sum of these five responses was used as a relative index of alcohol-related problems. Knowledge of the

effects of alcohol (e.g., "Alcohol tends to pep a person up") was a seven-item scale and knowledge-facts/prevalence (e.g., "Alcohol is a widely abused drug") was a three-item scale (the dichotomous nature of the response options for these scales prevented generation of estimates of internal consistency).

Designation and assignment of risk/protective factors

Based on their respective distributions, a total of 22 individual measures were dichotomized using the upper (or respectively lower) 20th percentile.³ In order to create binary risk factors, students in the upper (or lower, depending on the scaling of the original measure) 20th percentile were assigned a "1" (designating them as "at-risk"), and the remaining portion of the distribution were assigned a "0" for no-risk. For example, distributions for the 10-item behavioral control item (assessing task persistence, attentiveness and diligence) indicated that 20.8% of the sample at Time 3 (8th grade) and 21% of the sample at Time 5 (10th grade) were considered being "at-risk," having low scores on this multi-item scale.

The same process was repeated to designate protection (with a reduced set of 13 measures).⁴ Students with scores in the 20th percentile that represented protection or resilience from drug use were assigned a "1" with the remainder assigned a "0." This technique assures that youth with extreme forms of the behavior in question (e.g., low self-control), which would likely to be regarded as an instigator of alcohol use, are exemplified as "at-risk." Conversely, in the case of protection, students with high levels of a particular quality (e.g., high behavioral control), which would potentially serve as a barrier against alcohol use, are designated as "resilient" (this is an important distinction particularly where the absence of this quality may not denote "at-risk" status; see also Rutter, 1990). The 22 binary risk factors were then assigned to one of five risk indices and the 13 protective factors to one of three protective indices. This procedure was repeated for both the 8th and 10th grade assessments resulting in a total of 10 risk and 6 protective indices. The five additive risk indices available at both the 8th and 10th grades included competence (i.e., grades, decision-making skills, cognitive self-management and academic esteem), psychological functioning (i.e., behavioral control, depressive/anxious symptoms, locus of control, antisocial behavior and self-esteem), interpersonal functioning (social control, perceived adult support, perceived functional support, social anxiety and assertiveness skills), cognitive-affective influences (i.e., social reinforcement expectancies for alcohol, knowledge of near-term health effects and knowledge of facts/prevalence for alcohol use) and social influences (i.e., perceived friends' alcohol use, parent attitudes toward alcohol use, friends' attitudes toward alcohol use, and normative expectations for peer and adult alcohol use). Based on the reduced set of protective factors available for dichotomization, three protective indices were constructed including competence, psychological functioning and interpersonal functioning. Assignment of the risk/protective factors to their respective indices was based on reviews of the alcohol and drug abuse etiology (Petrakis et al., 1995) and prevention literatures (Botvin and Botvin, 1992; Hawkins et al., 1992). Several criteria were applied in the assignment process including: (1) determining the conceptual relatedness among these measures (e.g., knowledge items and expectancies are usually regarded as a single modifiable component in the design of school-based preventive interventions); (2) the strength of past empirical findings pertaining to the relative grouping of similar risk/protective factors and their predictive prominence for multiple classes of drugs (i.e., alcohol and marijuana) (e.g., Kandel, 1978); and (3) developmental considerations that arguably bind many risk/protective factors together as developmental tasks during this important period of the lifespan (e.g., self-management, grades and academic esteem can be viewed as a single developmental milestone). It is important to recognize that no single theoretical perspective guided the selection and assignment of risk/protective factors to their respective indices. Newcomb (1992; see also Newcomb and

Felix-Ortiz, 1992) has suggested that a risk factor methodology comes closest to a cumulative stress and resiliency model, crossing over many theoretical boundaries and integrating key predictors derived from disparate approaches into a single comprehensive model. In this respect, risk/protective indices represent cumulative or relative risk indicators that may not be statistically homogeneous (i.e., inter-correlations among individual risk factors within a single index may be low to moderate). On the other hand, and as specified in interactional models of adolescent drug use, individual factors within each index may be etiologically and developmentally linked (Sadava, 1987).

Alcohol use measures

One item each assessed frequency and intensity of alcohol use and a single item assessed drunkenness. Frequency of use was worded, "How often (if ever) do you drink alcohol beverages," with responses ranging from "never tried them" (1) through "more than once a day" (9); whereas intensity was worded, "How much do you usually drink each time you drink," with responses ranging from "I don't drink" (1) through "more than 6 drinks" (6). A single item tapping drunkenness was worded, "How often do you get drunk," with responses ranging from "I don't drink" (1) through "more than once a day" (9). Individual alcohol use items were rescaled using a percentile indexing method proposed by Lu (1974) and modified by Douglass and Khavari (1982). Raw scale scores were indexed based on an algebraic formula that included the proportion of students responding to the specific item added to the number of students responding to previous items on the same question. According to this method, the indexed value for a student obtaining a raw score of 3 on a five-point anchored scale would computationally reflect the frequency of students selecting response options 1 and 2 and the halved frequency choosing 3 to the same question (the summed frequencies are divided by the total *N* responding to the item). Percentile indexing gives greater weight to more extreme but less frequently endorsed responses and centers the distribution on a midpoint corresponding to the 50th percentile (which facilitates interpreting individual scores as deviations from .50).

Categorical levels of alcohol use

For analytic purposes, we constructed a three-level categorical alcohol use measure at each assessment point (T3ALC and T5ALC) in the following manner: Current frequency of drinking (9-point scale) was broken down into (1) no-use (which included "never tried them" and "tried them, but don't drink them now"); (2) occasional or experimental use (which included "less than once a month," "about once a month" and "about two or three times a month"); and (3) moderate-heavy use (which included "about once a week" through "more than once a day"). Cell numbers were inadequate for separate

analyses of a more refined four-level categorical measure of alcohol use (there were too few students in the heavy use cell). Respective cell population numbers corresponding to each of these usage patterns are presented below.

Data analysis strategy

Several analytic strategies were used to test the hypotheses underlying this research. Longitudinal bivariate associations between the risk and protective indices and alcohol use (averaged measure of frequency, intensity and drunkenness) were calculated for the panel sample. Mean comparisons based on gender for the 8th and 10th grade risk and protective indices and alcohol consumption measures are then reported. Longitudinal models predicting increased alcohol involvement, controlling for early levels of use, were then tested using hierarchical regression methods with specific *a priori* inclusion. Predictor variables were entered (i.e., forced entry multiple regression) in five groups. First, controls for gender and 8th-grade alcohol use were entered, followed by measures of average or chronic risk, change in risk (8th to 10th grade), average protection and change in protection between assessments. Following prediction of general alcohol involvement, we then limited the sample to those students whose alcohol use remained consistent (i.e., maintenance) across the 3-year period and those students who increased the frequency of their alcohol use to levels indicative of problematic use. Based on their respective categorical measures of alcohol use (T3ALC and T5ALC), a new binarily coded variate (ALCCH35) was created, capturing transitional alcohol use patterns between the 8th and 10th grades. Students who increased their level of use between 8th and 10th grades were assigned a "1," whereas students decreasing use between the two assessments were assigned "-1" and students remaining consistent in their use patterns over time were assigned "0." Using logistic regression, and limiting the analysis to include increased and maintained alcohol use patterns, we then examined the predictive power of average risk, change in risk, average protection and change in protection to account for transitional alcohol use patterns between 8th and 10th grade (again controlling for gender and early [8th grade] alcohol use).

Results

Panel attrition

Sample attrition between assessments is primarily due to absenteeism and subject relocation. Overall, 976 subjects were available in the 8th grade and 823 of these students were retained for the 10th grade follow-up, representing a loss of 16% of the students. The percent subject loss compares favorably with similar prospective school-based intervention studies (e.g., Hansen et al., 1990). Both proportional tests of independence and mean difference tests were con-

ducted to distinguish the effect of panel loss on the percent of alcohol (and other drug) users remaining in the sample from the effect this loss might have on the variability for the behavioral measures (Snow et al., 1992).

Although the current study focuses on alcohol use, additional measures included in the study assessed frequency of cigarette smoking ("How much do you generally smoke now?") on a 7-point scale ranging from never (1) to more than a pack a day (7); and marijuana use ("How often, if ever, do you usually smoke marijuana?") on a 9-point scale ranging from never tried it (1) to more than once a day (9). Panel attrition analyses revealed a disproportionate loss of cigarette smokers ($\chi^2 = 18.25$, 1 df, $p < .001$; 26% vs 12% reporting use for dropouts and panel students, respectively) and marijuana users at follow-up ($\chi^2 = 3.99$, 1 df, $p < .05$; 10% vs 6% reporting use for dropouts and panel students, respectively). Mean comparisons revealed that dropouts smoked cigarettes more frequently in the 8th grade (1.85 vs 1.31) ($t = 3.82$, 171 df, $p < .001$). There was a marginal trend for dropouts to report drinking alcohol more frequently ($p < .10$) and smoke marijuana more frequently ($p < .10$). Dropouts had higher mean risk scores for competence (0.98 vs 0.77) ($t = 2.51$, 974 df, $p < .05$), lower alcohol knowledge and higher alcohol expectancies (1.33 vs 1.15) ($t = 2.36$, 963 df, $p < .05$), and there was a marginal trend for dropouts to have higher risk scores for (poor) psychological functioning ($p < .07$).

Panel students, on the other hand, had higher competence protective index scores (0.82 vs 0.64) ($t = -2.04$, 974 df, $p < .05$). Based on a logistic regression model predicting attrition status, only competence risk ($\beta = -.03$, $p < .05$) and interpersonal risk ($\beta = .03$, $p < .05$) significantly predicted retention. This model accounted for less than 2% of the variance in attrition status. Finally, the slightly disproportionate number of male students in the 8th grade (51.4%) remained stable at follow-up and there were no significant gender differences in alcohol involvement or other illicit drug use based on attrition. Given the few significant attrition differences, we can be guardedly optimistic that the few biases attributed to sample retention would not affect the generalizability of these findings.

Descriptive summary of alcohol use trends

In the 8th grade, 42.3% of the sample reported current use of alcohol (in addition, 14.5% of the nonabstaining sample reported experience smoking cigarettes and 6.4% reported some use of marijuana). For the follow-up sample, this percentage increased to 66.1% current alcohol use ($p < .001$). Corresponding cigarette and marijuana usage patterns among nonabstainers at follow-up were 23.4% and 18.4%, respectively. Among the students reporting current alcohol use in the 8th grade, slightly under one-third reported drinking in the past month, 16.4% in the past week and 5.3% drank the day before. Proportional chi-square analyses indicated

that alcohol was frequently used by youth also reporting other illicit drug use. For example, 12.7% of those reporting current alcohol use also reported smoking a pack a week of cigarettes or more. Almost 8% of the nonabstaining sample reported using marijuana at least two or three times a month and 13% of these youth reported smoking marijuana in the past month, 7% in the past week and 4% the day before.

Consistent with the significantly increased level of reported alcohol involvement at follow-up, a greater percentage of students reported drinking in the past month (78.4%), past week (45%) and previous day (13.6%). Patterns of multiple drug use among alcohol users at follow-up were consistent with the 8th-grade trends. For example, 19.4% of reported alcohol users at follow-up reported smoking at least a pack a week or more of cigarettes. Fifteen percent of the nonabstaining sample reported using marijuana at least two to three times a month and 24% of these youth reported smoking marijuana in the past month, 12% in the past week and 6% the day before. This trend toward multiple substance use patterns has been observed in similar school-based samples (e.g., Bailey, 1992; Newcomb and Bentler, 1988).

Categorization of alcohol involvement

Based on reported prevalence for the frequency of alcohol use measure in the 8th grade, 44.4% of the nonabstainers were categorized as experimental users and 7% as moderate-heavy users. At follow-up these numbers included 54.2% experimental users and 18.8% moderate-heavy users. Proportional chi-square analyses were used to determine if moderate-heavy users were at greater risk for frequency of alcohol use, self-reported drunkenness and recent alcohol usage (i.e., past month, week, day), or use of multiple substances (cigarettes and marijuana) over a similar time frame (month, week and day). Overall, all of the comparative analyses reinforced that moderate-heavy users were significantly more at risk (p 's $< .001$) for all of the behavioral conditions considered at both the 8th grade and follow-up assessments. There was also a significant relationship between gender and categorical level of alcohol use, with more males being classified as heavy users ($p < .001$).

Mean gender differences for alcohol use and psychosocial measures

Mean comparisons for alcohol involvement and the risk/protective indices were conducted separately for the 8th-grade and follow-up samples. In the 8th grade, male students reported more frequent (2.82 vs 2.50) ($t = 3.04$, 946 df, $p < .01$) and intense drinking (2.10 vs 1.87) ($t = 2.69$, 937 df, $p < .01$). In addition to differences in alcohol consumption, male students reported smoking more marijuana (1.43 vs 1.25) ($t = 2.50$, 839 df, $p < .05$). With respect to the risk and protective indices, there was a marginal trend for male students to have higher competence risk scores

($p < .10$) and a marginal trend for female students to have higher social influence risk scores ($p < .10$).

At follow-up, male students reported more frequent alcohol use (3.87 vs 3.48) ($t = 2.90$, 836 df, $p < .01$), more intense drinking (3.14 vs 2.83) ($t = 2.62$, 852 df, $p < .01$), more drunkenness (2.84 vs 2.55) ($t = 2.28$, 828 df, $p < .05$), and a marginally significant trend for more frequent marijuana use ($p < .10$). At follow-up, male students had higher interpersonal risk scores (1.24 vs 1.08) ($t = 2.23$, 848 df, $p < .05$), less alcohol knowledge and higher alcohol expectancies (1.18 vs 0.93) ($t = 4.12$, 852 df, $p < .001$). Female students, on the other hand, had significantly higher competence scores (0.93 vs 0.66) ($t = 3.96$, 818 df, $p < .001$), psychological functioning (1.02 vs 0.87) ($t = 1.89$, 854 df, $p < .06$) and interpersonal protection scores (1.13 vs 0.88) ($t = 3.53$, 828 df, $p < .001$).

Longitudinal associations between risk, protection and alcohol involvement

Bivariate associations between the 8th-grade indices and alcohol involvement and the 10th-grade indices and alcohol use are contained in Table 2. Risk was positively associated with alcohol use, whereas protection was negatively associated with alcohol involvement. Among the risk and protective indices, the largest magnitude of association was between alcohol use and social influences, followed in decreasing magnitude by psychological functioning and competence.

Alcohol was moderately stable over the 3-year period ($r = .55$). The magnitude of associations among the measures of psychosocial functioning (both risk and protection) also serve as a validity check, reinforcing the distinctiveness or conceptual similarity among these developmental constructs. Table 2 also contains the longitudinal associations between 8th and 10th grade measures of the same risk/protective index. Correlations among same index measures across time ranged from a high of $r = .40$ for psychological functioning (risk) to a low of $r = .35$ for both the risk and protection competence indices. The moderately sized stability coefficients for these indices reinforces that, during the period between the 8th and 10th grades, many youth experienced developmental flux in these processes. The absence of any substantially large correlations between different domains of risk and, likewise, between different domains of protection also reinforces that, by using multiple measures, we have adequately captured unique aspects of risk and protective processes. In fact, excluding relationships with alcohol, the largest cross-domain relationship contained in the matrix between the Time 3 competence and Time 5 psychological functioning protective indices reveals only 25% shared variance ($r = .50$).

In order to effectively determine if chronic measures of risk/protection and change scores were statistically unrelated, we correlated the chronic risk/protection measures

TABLE 2. Longitudinal associations between risk and protective indices and alcohol use: Panel sample ($N = 823$)

8th Grade	Follow-up (10th Grade)									Time 5 (10th Grade)
	1	2	3	4	5	6	7	8	9	Mean (\pm SD)
Risk indices										
1. Social influences	.32 ^a	.12	.18	.17	.06	.37	-.16	-.17	-.08	3.03 \pm 1.45
2. Cognitive-affective	.12	.30	.12	.13	.07*	.20	-.13	-.19	-.07 [§]	1.05 \pm 0.88
3. Competence	.14	.15	.35	.25	.16	.22	-.22	-.30	-.07*	0.79 \pm 0.96
4. Psychological	.18	.13	.25	.40	.17	.30	-.24	-.16	-.09*	1.01 \pm 1.15
5. Interpersonal functioning	.06	.02	.11	.18	.37	.04	-.17	-.13	-.22	1.15 \pm 1.07
6. Alcohol use ^b	.34	.13	.18	.21	.03	.55	-.16	-.22	-.07 [§]	0.50 \pm 0.27
Protection										
7. Competence	-.18	-.19	-.25	-.26	-.12	-.26	.35	.50	.16	0.79 \pm 1.02
8. Psychological	-.12	-.14	-.24	-.29	-.19	-.23	.44	.33	.24	0.94 \pm 1.15
9. Interpersonal functioning	-.05	-.06	-.11	-.11	-.25	-.01	.15	.17	.32	1.00 \pm 1.04
Time 3 (8th Grade) ^c										
Mean (\pm SD)	2.43 \pm 1.48	1.15 \pm 0.89	0.77 \pm 0.92	0.87 \pm 1.10	1.12 \pm 1.11	0.49 \pm 0.25	0.83 \pm 1.04	0.87 \pm 1.16	1.07 \pm 1.03	

^aElements on the diagonal represent longitudinal bivariate correlations (between 8th and 10th grade measures).^bComposite scale including measures of frequency, intensity and drunkenness.^cMeans along the bottom row are for Time 3 (8th grade), whereas means on the right column are for Time 5 (10th grade).* $p \leq .05$. Unless otherwise indicated, correlations greater than $r = .10$ are significant ($p \leq .001$).[§]Marginal significance ($p \leq .07$).

with the change scores for each index. The average absolute correlation for the five risk indices was .03 and the average absolute correlation for the three protective indices was .02. The lack of substantial relations among the measures of chronicity and change reinforce that different elements of variability for risk/protection are being captured in these conceptually different measures.

Longitudinal prediction of alcohol involvement from risk and protection

Table 3 contains the results of the longitudinal multiple regression analyses for alcohol involvement. Using forced entry, a composite of 8th-grade alcohol use (frequency, intensity and drunkenness) and gender were entered first followed by a hierarchical forward inclusion of the remaining measures with a specified order of chronic risk, change in risk, chronic protection and change in protection. This strategy provides statistical information on the incremental variance associated with each block of predictors (Cohen and Cohen, 1983). At each of the steps, early alcohol use was a strong predictor of subsequent use; however, gender was not a significant predictor. At Step 1 and thereafter, so-

cial influence risk was highly significant and the associated regression parameter was relatively large. Among the chronic risk measures, competence ($\beta = .07$), psychological functioning ($\beta = .15$) and interpersonal functioning ($\beta = -.06$) were also significant (Betas reported at each step). When change in risk was incrementally added to the model (controlling for the covariates and chronic risk), increased social influence ($\beta = .26$) and competence risk ($\beta = .06$) were significant predictors (in addition to chronic social influences and psychological functioning remaining significant). Finally, among the measures of chronic protection, psychological functioning ($\beta = -.07$) and interpersonal functioning ($\beta = .07$) were significant predictors. As a block, the indicators of change in protection did not meet the statistical criteria for entry into the equation, suggesting that increased levels of protection did not offset conditions of chronic and increased risk or add significantly to conditions of chronic protection. The bottom portion of Table 3 contains summary regression statistics for each step in the model building sequence. As depicted, the overall proportion of variance accounted for in each step was significant as was the incremental variance accorded to each step.

TABLE 3. Regression statistics for longitudinal model predicting Time 5 (10th grade) alcohol involvement

Variate entered	Corresponding step ^a			
	1	2	3	4
8th Grade (covariates)				
Time 3: Alcohol composite ^b	.55 [‡]	.27 [‡]	.38 [‡]	.37 [‡]
Gender ^c	.01	.04	.03	.03
Average risk				
Social influences		.35 [‡]	.29 [‡]	.29 [‡]
Competence		.07*	.07*	.05
Psychological functioning		.15 [‡]	.13 [‡]	.11 [‡]
Cognitive-affective		.04	.05 [‡]	.04
Interpersonal functioning		-.06*	-.05 [‡]	-.03
Change in risk				
Social influences			.26 [‡]	.26 [‡]
Competence			.06*	.07*
Psychological functioning			.04	.03
Cognitive-affective			.04	.04
Interpersonal functioning			.01	.01
Average protection				
Competence				-.02
Psychological functioning				-.07*
Interpersonal functioning				.07*
Summary regression statistics				
Adj. R^2	.31	.43	.51	.51
ΔR^2	—	.13	.07	.01
F^d	181.26	36.5	23.4	3.70
p	.0001	.0001	.0001	.05

^aVariates entered in blocks corresponding to gender and Time 3 (8th grade) alcohol use, average risk, risk change scores, average protection, and protection change scores. Final block (change in protection) did not meet F -to-enter criteria ($p \leq .10$).

^bFrequency of use, intensity and drunkenness.

^cFemales coded (0), males coded (1).

^dFollowing the initial step, F -ratio and p -value corresponds to incremental variance.

[‡] $p \leq .10$. * $p \leq .05$. [†] $p \leq .01$. [‡] $p \leq .001$.

Predicting transitions in alcohol use

Next, using the categorical measure of alcohol frequency (T3ALC and T5ALC) we limited the sample to those students who did not change their self-reported frequency of alcohol use between assessments ($N = 430$) and those students who increased their use patterns over time ($N = 323$); there was an insufficient number of decreaseers to conduct robust statistical analyses for a three-way analysis including decreased consumption. Using logistic regression, a dummy coded transition measure (ALCCH35) was regressed on the same set of chronic and difference risk and protection scores included in the previous regression model. Again, early alcohol use and gender were entered first into the equation. Because conventional logistic procedures do not allow forced entry using blocks of predictors, we chose to enter the predictor groups sequentially, running five separate models. In the first model, 8th-grade alcohol use and gender were included. In a subsequent step, following inclusion of the two covariates (gender and 8th-grade alcohol use), we entered the chronic (average) risk scores. Following this model, we entered the difference risk scores (first including the covariates and chronic risk measures) to determine the change in model parameterization. This procedure was then repeated for the chronic protection scores and the difference protection scores. Results of this procedure are contained in Table 4 (including odds ratios and standardized parameters estimates).

Among the two covariates, early alcohol use significantly predicted transitional use⁵ (model $\chi^2 = 27.4$, 2 df, $p < .001$). At the next step, chronic risk indices were entered and only social influences and psychological functioning were signif-

icant predictors. Model fit statistics indicated that the joint explanatory power of the predictors was significant ($\chi^2 = 83.03$, 5 df, $p < .001$) and significantly improved upon the previous model containing the two covariates ($\Delta\chi^2 = 56.3$, 3 df, $p < .001$). Again, the parameter estimate associated with social influence risk ($\beta = .31$) was relatively large compared to psychological functioning ($\beta = .17$). The odds ratios, however, were relatively similar, suggesting that, controlling for early alcohol use, the odds of transitioning from low to higher levels of alcohol use increased by a factor of 1.61 for each one-unit increase in social influences and increased 1.39 for a one-unit increase in psychological functioning.⁶ Measures of chronic risk for cognitive-affective influences (knowledge and expectancies) and interpersonal functioning did not meet the entry criteria for inclusion in the model.

The block of difference risk scores was then entered sequentially and this model was also significant ($\chi^2 = 124.64$, 9 df, $p < .001$) and incremented significantly from the previous model ($\Delta\chi^2 = 41.6$, 4 df, $p < .01$). Among the five possible predictors in this block, changing risk status for social influences and competence were both significant (p 's $< .001$). Thus, partialling for chronic levels of risk, youth who experienced decreases in their competence and increases in social influence risk over the 3-year period were more likely to increase their alcohol use. The next model included the chronic protection scores and this model contained a significant set of explanatory measures ($\chi^2 = 140.80$, 15 df, $p < .001$), but did not improve significantly upon the previous model ($\Delta\chi^2 = 16.16$, 6 df, $p > .05$). Significant predictors in the group of protection

TABLE 4. Parameter estimates and odds ratios from longitudinal model predicting transitional alcohol use (8th–10th grade)

Variate entered	Corresponding step							
	β	OR	β	OR	β	OR	β	OR
8th Grade (covariates)								
Alcohol use (Time 3)	-.22 [‡]	0.21	-.48 [‡]	0.03	-.44 [‡]	0.04	-.44 [‡]	0.04
Gender	.04	1.15	.07	1.27	.07	1.29	.06	1.27
Average risk								
Social influences			.31 [‡]	1.61	.29 [‡]	1.55	.28 [‡]	1.55
Competence			.04	1.09	.04	1.09	.00	1.01
Psychological functioning			.17 [‡]	1.39	.18 [‡]	1.42	.13*	1.28
Cognitive-affective			— ^a	—	.04	1.11	.02	1.05
Interpersonal functioning			—	—	-.06	0.88	-.04	0.92
Change in risk								
Social influences					.24 [‡]	1.30	.24 [‡]	1.30
Competence					.16 [‡]	1.31	.14 [‡]	1.27
Psychological functioning					—	—	.05	1.08
Cognitive-affective					—	—	.08	1.15
Interpersonal functioning					—	—	.03	1.04
Average protection ^b								
Competence							-.06	0.97
Psychological functioning							-.17 [‡]	0.73
Interpersonal functioning							.10 [§]	1.24

Notes: OR = Odds ratio. β = Standardized regression coefficient.

^aDid not meet entry criteria for inclusion in the model.

^bSelect entry criteria modified ($p \leq .30$) to accommodate the inclusion of these indicators.

[§] $p \leq .10$. * $p \leq .05$. [‡] $p \leq .01$. ^{‡‡} $p \leq .001$.

scores included psychological functioning (protection), which decreased the likelihood of transitional alcohol use, and there was a marginal trend ($p < .06$) for protection associated with interpersonal functioning to increase transitional alcohol use. At this point in the model step procedure, no further protection scores would significantly improve the likelihood chi-square.⁷

Discussion

Social influences occupy a primary position in the prediction of alcohol involvement and many prevention programs have incorporated this knowledge as part of their basic strategies to reduce adolescent alcohol use. However, a wide range of studies underscore that intrapsychic factors also play an important role stimulating increased and more problematic levels of consumption. As a result, specific prediction and delineation of high-risk youth with abusive drinking practices suggests the need for incorporation of a wider array of risk and protective factors. Toward this end, findings from the current study confirm that peer models of drinking and normative expectations for both adult and peer use continue to exert a strong influence on alcohol consumption. Both chronic levels of social influence risk and changes in social influence risk were salient predictors of alcohol involvement, even when controlling for initial drinking and all other forms of chronic risk and change in risk status over time. In addition to these findings, however, we also found that psychological factors are key determinants of both alcohol involvement and change in drinking patterns from initial use to more problematic use. Characteristics of chronic (and extreme) psychological risk included a lack of behavioral control, high levels of depressive and anxious symptoms, an external locus of control, antisocial behavior, and low self-esteem. These findings are in concert with those reported by Labouvie et al. (1991) who, among other key determinants, also reported lack of behavioral control (i.e., emotional outbursts and impulsivity) as predictive of higher levels of alcohol use.

In addition to features associated with chronic risk, heightened vulnerability was also associated with increasing levels of risk. Deficits in competence predicted both general alcohol involvement and transitions in alcohol use over time. Thus, increased susceptibility was based partly on psychological factors (i.e., depressive symptoms) and partly on decreased competence, the latter including self-reports of lower grades, poor decision-making skills, low self-management and academic self-esteem. At least two important implications are highlighted by the combination of these predictive domains. First, past empirical findings have prompted some researchers to suggest the utility of a stress-coping perspective as a useful explanatory framework from which to understand normative adolescent development and the onset or exacerbation of alcohol use (i.e., Pentz, 1985; Wills and Shiffman, 1985). Although

we did not directly test this perspective, our findings seem to support that stress in specific areas of functioning associated with school (i.e., competence) and personal status (i.e., depressive symptoms) contribute to increased alcohol consumption.

Change is a developmental hallmark of adolescence and although most youth successfully navigate this period it would appear, based on the current data, that some youth fail to negotiate specific transitions and as a result increase their alcohol use. The specific areas of functioning that appear most problematic entail the peer group with its changing behavioral norms (i.e., peer models) and competency (e.g., self-control, decision-making and academic esteem), the latter referring to cognitive-developmental skills that are essential for transitioning to normal adult functioning. With respect to the former, peer friendship networks widen during this time period, become more influential in adolescent decision-making, and take on the added dimension of providing a basis for social comparison (Brown, 1990). Failure to adequately adjust to these changes may result in feelings of self-derogation and a sense of hopelessness. The combined effect of these feelings and the sense of inadequate personal resources may lead to depression and other problems in living. In this respect, juxtaposed against adult standards for psychopathology and clinical evidence of dependence and abuse, it appears that there are clear and detectable markers for increased and problematic alcohol consumption among more youthful drinkers.

Second, enhancing competency skills occupies an important role in school-based preventive efforts to reduce alcohol and other drugs (e.g., Dusenbury and Botvin, 1992; Pentz, 1985), and the current findings reinforce the continued need to strengthen cognitive developmental skills as a first line of defense against excessive alcohol use. Both primary prevention and clinical treatment could benefit if more could be learned about specific features of the processes that catalyze transitions from the initial stages of alcohol use to abuse. On the one hand, discovery of a common set of risk mechanisms that facilitate both initiation and progression would assist in the implementation of generic and cost-effective intervention strategies (Bell, 1988; Winick, 1985). Alternatively, it is important to begin to understand the specific conditions that make some youth more vulnerable than others (Chassin, 1984). Toward this end, the current study highlights that multiple conditions of risk lead to alcohol involvement and that these conditions include important facets of age-appropriate socioemotional development (i.e., competence and psychological functioning).

Furthermore, this study also supports the belief that superior psychological functioning protects some youth against the heightened conditions of risk and decreases the likelihood of alcohol involvement. This was true both for general alcohol involvement and long-term transitions from initial to more problematic use. Although affectively-based drug prevention programs, which emphasize imparting strategies to

cope with emotional stress, have not met with much success (e.g., Hansen et al., 1988; Moskowitz et al., 1984), the current findings underscore the need to reconsider the role of these processes and the close developmental interplay between cognitive strategies and affective processes during this critical period of development.

Interestingly, protection associated with social skills and interpersonal functioning was positively associated with alcohol involvement and likewise with transitional use patterns (although the latter statistic was marginally significant). One of two explanations may account for this seemingly counterintuitive relationship. Beneficial effects from alcohol have been reported in both adolescent (Newcomb et al., 1986a) and adult literatures (e.g., Baum-Baicker, 1985), and it is not surprising that at younger ages alcohol abuse and social skills are positively associated. Processes leading to enhancement of social skills can often offset negative conditions associated with peer rejection, poor competence and negative psychological functioning, features typically associated with low self-esteem. In many cases, youth with low self-esteem may benefit from deviant associations, despite increased peer models and behavioral norms proscribing use of alcohol that often accompany norm-transgressing peers. Both peer cluster (Oetting and Beauvais, 1986) and self-derogation (Kaplan et al., 1984) theories suggest that deviant peer networks inculcate positive self-regard and help alleviate feelings of low self-worth. In the current study, the social skills risk index included items tapping perceived peer and adult support, social concern (i.e., "You tell someone who is embarrassing you to stop"), social anxiety (i.e., "I worry about whether other people will like to be with me") and assertiveness (i.e., "Ease of asking someone out for a date"), aspects of interpersonal functioning that are inextricably linked to feelings of self-worth. In many cases, alcohol can function to disinhibit some youth and the accompanying change in their social status (and the corresponding expectancies) may retain reinforcing properties that engender future alcohol use.

A second, and more statistical, explanation bears on the possibility of suppressor relationships among the predictors, which would account for the change in direction observed in the regression models. For instance, interpersonal functioning (risk) has a small but positive zero-order relationship with both early and subsequent alcohol use (Table 2), albeit the parameterization of this risk index in the regression models is negative (and conversely the protection index is parameterized as positive). Quite possibly, elements of the interpersonal functioning index are moderately related to risk/protective indices already included in the regression model and the residualization of these parameters contributes to the suppressor relations observed in the multiple regression. In light of the success of prevention strategies that lay claim to the strength of social efficacy as a deterrent against alcohol and other drug use (e.g.,

Pentz, 1985), further examination of these statistical relations is required.

Limitations

There are several limitations associated with the current study. First, prevalence estimates from the current data reinforce the absence of large numbers of youth with extreme patterns of alcohol use. Although the alcohol use prevalence estimates derived from the current sample closely align with both regional and national estimates (e.g., Johnston et al., 1996; Oetting and Beauvais, 1990), the small number of extreme high-end users makes it essential to validate the current findings with both treatment and clinical populations, where alcohol prevalence rates should be higher and thus correct for the conservative estimates encountered in school-based research. Despite this caution, a sufficiently large number of youth moved from very low levels of alcohol use to higher levels of abuse over the course of the study, permitting us to examine predictors of transitional alcohol use patterns.

A second limitation pertains to the difficulty of delineating early stages of alcohol use and more protracted levels of use. Adolescents are quite different from adults in their alcoholic use patterns as well as the consequences of these use patterns. By their very developmental nature, adolescents are often insulated from the types of consequences that drinking provides in work and social settings, and their experience with alcohol is more limited, thus dampening opportunities to examine negative sequelae. We relied on self-reported frequency of use to create a meaningful categorical measure that captured the full spectrum from initial to problematic use. Notwithstanding, other studies that include multiple (and perhaps more stringent) criteria to categorize involvement and that include a similar array of psychosocial measures are essential to cross-validate these findings.

Finally, we relied on a stringent set of criteria to determine "risk" status (i.e., dichotomization at the 20th percentile). Although no set a priori criteria exist for determining elevated levels of risk, or for that matter protection, our choice of this empirical cut-off is even more liberal than the original coronary heart disease risk reduction trials from which this methodology is drawn (MRFIT, 1982). However, because of the complex nature of adolescent development and the fact that many youth have some but not all of the conditions of risk and protection that we included in our model, it was essential that we create a systematic means of distinguishing youth at "greatest" risk for each of the risk factors (or conversely greatest protection) from those who may have present some, but not all, of the risk conditions (e.g., five friends using alcohol versus one or two friends). In a related vein, Newcomb (1992) suggested that the rarity of participants drawn from a community sample possessing extreme risk and protective factor scores dictates the choice of a 20% cut-point. Further studies need to replicate not only the cut-offs, but the general-

izability and heuristic utility of the risk and protective factors that we included in our model.

Acknowledgments

The authors wish to thank Erich W. Labouvie, Ph.D., and the anonymous reviewers for their helpful comments on an earlier version of this article.

Notes

1. The term *abuse* is not meant to comply with DSM-IV (American Psychiatric Association, 1994) or clinically appropriate nosology for alcohol dependence, but, rather, to designate a more protracted and chronic form of drinking behavior encountered with youthful populations. In this respect, a more meaningful classification would refer to *use* as experimental or initial-stage drinking and *abuse* as problematic or exacerbated drinking that can have serious physical, social and personal complications (the latter which are necessary but not sufficient conditions for DSM-IV classification as alcohol dependence). More detailed conceptual arguments on the distinction between substance use and abuse are presented by Newcomb (1992), Newcomb and Bentler (1989) and Chassin (1984).
2. The selection of these time periods was intended to maximize differentiation of alcohol use categories (i.e., sufficient numbers of youth reporting experimental or moderate-heavy alcohol use) as well as provide sufficient variation in current frequency of alcohol use to facilitate examination of transitions in use. Time 1 (7th grade) was the true baseline and Time 2 was a 3-month posttest.
3. The protocols that we relied on to establish the empirical cut-offs for designating extreme risk profiles were derived from a series of earlier studies designed to assess morbidity and mortality related to cardiovascular and coronary heart disease (MRFIT, 1982; Pooling Project Research Group, 1978; Zukel et al., 1981). Based on multiple considerations stemming from these large-scale epidemiologically-based field trials, subjects in the coronary heart disease studies were designated at "increased risk if their levels of three risk factors—cigarette smoking, serum cholesterol, and blood pressure were sufficiently high at a first screening visit to place them in the upper 15% of a risk score distribution based on data from the Framingham Heart Study" (MRFIT, 1982, p. 1466). We felt 15% to be too stringent a criteria for determination of relative risk for measures of psychosocial functioning, none of which are directly tied to mortality. A more modest cut-off that comports with the recent literature on risk factors methods in substance abuse utilizes a 20th percentile cut-off, which we appropriated in the current study.
4. Unfortunately, distributions for the social influence, antisocial behavior and cognitive-affective measures did not permit binarily coding using the P-20, so a median split was used to create a binary risk measure. To avoid empirical dependence, only risk factors were created for these measures, thus reducing the number of protective indices to three.
5. The negative sign associated with this parameter coefficient correctly depicts that increased risk was associated with low-end alcohol users who made the greatest shift in their distributional position between assessments, and that high-end alcohol users, who occupied the extreme tail end of the distribution and had little variation in their alcohol use over time (this group was mostly comprised of stable users between assessments), were at decreased risk of transitioning between categorical levels (the response variable was coded so that transition probabilities were associated with "1").
6. The close symmetry between these odds may also be attributed to the moderate association between many of the predictor measures, which diminishes the opportunity for any single measure to maintain a sizable unique effect, controlling for other conceptually related risk indices (e.g., competence and psychological functioning were moderately related as observed in the zero-order matrix of correlations; see Table 2).
7. Entry of the difference protection would necessitate increasing the risk of Type I error (the rate would be in excess of 30%), which, despite the exploratory nature of this study, we determined would not likely lead to interesting and replicable findings.

References

- AMERICAN PSYCHIATRIC ASSOCIATION. Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), Washington, D.C., 1994.
- BAILEY, S.L. Adolescents' multisubstance use patterns: The role of heavy alcohol and cigarette use. *Amer. J. Publ. Hlth* **82**: 1220-1224, 1992.
- BANDURA, A. Self-efficacy: Toward a unifying theory of behavioral change. *Psychol. Rev.* **84**: 191-215, 1977.
- BANDURA, A. Social Foundations of Thought and Action: A Social Cognitive Theory. Upper Saddle River, N.J.: Prentice-Hall, Inc., 1986.
- BATES, M.E. AND PANDINA, R.J. Individual differences in the stability of personality needs: Relations to stress and substance use during adolescence. *Pers. Individ. Diff.* **10**: 1151-1157, 1989.
- BAUM-BAICKER, C. The psychological benefits of moderate alcohol consumption: A review of the literature. *Drug Alcohol Depend.* **15**: 305-322, 1985.
- BELL, R. Using the concept of risk to plan drug use intervention programs. *J. Drug Educ.* **18**: 135-142, 1988.
- BOTVIN, G.J. Prevention of adolescent substance abuse through the development of personal and social competence. In GLYNN, T.J., LUEKEFELD, C.G. AND LUDFORD, J.P. (Eds.) Preventing Adolescent Drug Abuse: Intervention Strategies. NIDA Research Monograph No. 47, DHHS Publication No. (ADM) 83-1280, Washington: Government Printing Office, 1983, pp. 115-140.
- BOTVIN, G.J., BAKER, E., DUSENBURY, L., BOTVIN, E.M. AND DIAZ, T. Long-term follow-up of a randomized drug abuse prevention trial in a white middle-class population. *JAMA* **273**: 1106-1112, 1995.
- BOTVIN, G.J., BAKER, E., DUSENBURY, L., TORTU, S. AND BOTVIN, E.M. Preventing adolescent drug abuse through a multimodal cognitive-behavioral approach: Results of a 3-year study. *J. Cons. Clin. Psychol.* **58**: 437-446, 1990.
- BOTVIN, G.J. AND BOTVIN, E.M. School-based and community-based prevention approaches. In: LOWINSON, J.H., RUIZ, P. AND MILLMAN, R.B. (Eds.) Substance Abuse: A Comprehensive Textbook, 2nd Edition, Baltimore, Md.: Williams & Wilkins Co., 1992, pp. 910-927.
- BROOK, J.E. AND BROOK, J.S. A developmental approach examining social and personal correlates in relation to alcohol use over time. *J. Gen. Psychol.* **149**: 93-110, 1988.
- BROWN, S.A., CREAMER, V.A. AND STETSON, B.A. Adolescent alcohol expectancies in relation to personal and parental drinking patterns. *J. Abnorm. Psychol.* **96**: 117-121, 1987.
- BRY, B.H., MCKEON, P. AND PANDINA, R.J. Extent of drug use as a function of number of risk factors. *J. Abnorm. Psychol.* **91**: 273-279, 1982.
- CAREY, K.B. Alcohol-related expectancies predict quantity and frequency of heavy drinking among college students. *Psychol. Addict. Behav.* **9**: 236-241, 1995.
- CHASSIN, L. Adolescent substance use and abuse. In: KAROLY, P. AND STEFFEN, J. (Eds.) Adolescent Behavior Disorders: Foundations and Contemporary Concerns, Lexington, Mass.: Lexington Books, 1984, pp. 99-152.
- CHASSIN, L.A., PRESSON, C.C. AND SHERMAN, S.J. Stepping backward in order to step forward: An acquisition-oriented approach to primary prevention. *J. Cons. Clin. Psychol.* **53**: 612-622, 1985.
- CHRISTIANSEN, B.A. AND GOLDMAN, M.S. Alcohol-related expectancies versus demographic/background variables in the prediction of adolescent drinking. *J. Cons. Clin. Psychol.* **51**: 249-257, 1983.
- CLAYTON, R.R. Transitions in drug use: Risk and protective factors. In: GLANTZ, M. AND PICKENS, R. (Eds.) Vulnerability to Drug Abuse, Washington, D.C.: American Psychological Association, 1992, pp. 15-51.

- COHEN, J. AND COHEN, P. *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*, 2nd Edition. Hillsdale, N.J.: Lawrence Erlbaum Assocs., Inc., 1983.
- COLDER, C.R. AND CHASSIN, L. The stress and negative affect model of adolescent alcohol use and the moderating effects of behavioral under-control. *J. Stud. Alcohol* **54**: 326-333, 1993.
- COOPER, M.L., RUSSELL, M. AND GEORGE, W.H. Coping, expectancies, and alcohol abuse: A test of social learning formulations. *J. Abnorm. Psychol.* **97**: 218-230, 1988.
- COOPER, M.L., FRONE, M.R., RUSSELL, M. AND MUDAR, P. Drinking to regulate positive and negative emotions: A motivational model and alcohol use. *J. Pers. Social Psychol.* **69**: 990-1005, 1995.
- COX, W.M. Personality correlates of substance abuse. In: GALIZIO, M. AND MAISTO, S.A. (Eds.) *Determinants of Substance Abuse: Biological, Psychological, and Environmental factors*. New York: Plenum Press, 1985, pp. 209-246.
- DONOVAN, J.M. An etiologic model of alcoholism. *Amer. J. Psychiat.* **143**: 1-11, 1986.
- DOUGLASS, F.M. AND KHAVARI, K.A. A major limitation of the percentile index of overall drug use indulgence. *Int. J. Addict.* **17**: 283-294, 1982.
- DUSENBURY, L. AND BOTVIN, G.J. Substance abuse prevention: Competence enhancement and the development of positive life options. *J. Addict. Dis.* **11**(3): 29-45, 1992.
- FLEMING, J.S. AND COURTNEY, B.E. The dimensionality of self-esteem. II. Hierarchical facet model for revised measurement scales. *J. Pers. Social Psychol.* **46**: 404-421, 1984.
- FLEMING, J.S. AND WATTS, W.A. The dimensionality of self-esteem: Some results of a college sample. *J. Pers. Social Psychol.* **39**: 921-929, 1980.
- GAMBRILL, E.D. AND RICHEY, C.A. An assertion inventory for use in assessment and research. *Behav. Ther.* **6**: 550-561, 1975.
- GRAHAM, J.W., MARKS, G. AND HANSEN, W.B. Social influence processes affecting adolescent substance use. *J. Appl. Psychol.* **76**: 291-298, 1991.
- HANSEN, W.B., GRAHAM, J.W., SOBEL, J.L., SHELTON, D.R., FLAY, B.R. AND JOHNSON, C.A. The consistency of peer and parent influences on tobacco, alcohol, and marijuana use among young adolescents. *J. Behav. Med.* **10**: 559-579, 1987.
- HANSEN, W.B., GRAHAM, J.W., WOLKENSTEIN, B.H., LUNDY, B.Z., PEARSON, J., FLAY, B.R. AND JOHNSON, C.A. Differential impact of three alcohol prevention curricula on hypothesized mediating variables. *J. Drug Educ.* **18**: 143-153, 1988.
- HANSEN, W.B., TOBLER, N.S. AND GRAHAM, J.W. Attrition in substance abuse prevention research: A meta-analysis of 85 longitudinally followed cohorts. *Eval. Rev.* **14**: 677-685, 1990.
- HAWKINS, J.D., CATALANO, R.F. AND MILLER, J.Y. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychol. Bull.* **112**: 64-105, 1992.
- HUBA, G.J. AND BENTLER, P.M. Causal models of personality, peer culture characteristics, drug use, and criminal behavior over a five-year span. In: GOODWIN, D.W., VAN-DUSEN, K.T. AND MEDNICK, S.A. (Eds.) *Longitudinal Research in Alcoholism*, Boston, Mass.: Kluwer-Nijhoff Publishing, 1984, pp. 73-94.
- JESSOR, R. AND JESSOR, S.L. *Problem Behavior and Psychosocial Development: A Longitudinal Study of Youth*. San Diego, Calif.: Academic Press, Inc., 1977.
- JOHNSON, V. AND WHITE, H.R. An investigation of factors related to intoxicated driving behaviors among youth. *J. Stud. Alcohol* **50**: 320-330, 1989.
- JOHNSTON, L.D., O'MALLEY, P.M. AND BACHMAN, J.G. *National Survey Results on Drug Use from the Monitoring the Future Study, 1975-1995, Vol. 2, Secondary School Students*, NIH Publication No. 96-4139, Washington: Government Printing Office, 1996.
- KANDEL, D.B. Convergence in prospective longitudinal surveys of drug use in normal populations. In: KANDEL, D.B. (Ed.) *Longitudinal Research on Drug Use: Empirical Findings and Methodological Issues*, Washington, D.C.: Hemisphere, 1978, pp. 3-38.
- KANDEL, D.B. Drug and drinking behavior among youth. *Ann. Rev. Sociol.* **6**: 235-285, 1980.
- KANDEL, D.B., DAIRIES, M., KARUS, D. AND YAMAGUCHI, K. The consequences in young adulthood of adolescent drug involvement. *Arch. Gen. Psychiat.* **43**: 746-754, 1986.
- KAPLAN, H.B. *Deviant Behavior in Defense of Self*, San Diego, Calif.: Academic Press, 1980.
- KAPLAN, H.B., MARTIN, S.S. AND ROBBINS, C. Pathways to adolescent drug use: Self-derogation, peer influence, weakening of social controls, and early substance use. *J. Hlth Social Behav.* **25**: 270-289, 1984.
- KENDALL, P.C. AND WILCOX, L.E. Self-control in children: Development of a rating scale. *J. Cons. Clin. Psychol.* **47**: 1020-1029, 1979.
- LABOUVIE, E. The coping function of adolescent alcohol and drug use. In: SILBEREISEN, R.K., EYFERTH, K. AND RUDINGER, G. (Eds.) *Development as Action in Context*, New York: Springer-Verlag, 1986, pp. 228-240.
- LABOUVIE, E.W. AND MCGEE, C.R. Relation of personality to alcohol and drug use in adolescence. *J. Cons. Clin. Psychol.* **54**: 289-293, 1986.
- LABOUVIE, E.W., PANDINA, R.J. AND JOHNSON, V. Developmental trajectories of substance use in adolescence: Differences and predictors. *Int. J. Behav. Develop.* **14**: 305-328, 1991.
- LU, K.H. The indexing and analysis of drug indulgence. *Int. J. Addict.* **9**: 785-804, 1974.
- MILLER, L. Neuropsychodynamics of alcoholism and addiction: Personality, psychopathology, and cognitive style. *J. Subst. Abuse Treat.* **7**: 31-49, 1990.
- MOSKOWITZ, J.M., SCHAPS, E., SCHAEFFER, G.A. AND MALVIN, J.H. Evaluation of a substance abuse prevention program for junior high school students. *Int. J. Addict.* **19**: 419-430, 1984.
- MULTIPLE RISK FACTOR INTERVENTION TRIAL RESEARCH GROUP. Multiple risk factor intervention trial: Risk factor changes and mortality results. *JAMA* **248**: 1465-1477, 1982.
- NEEDLE, R., LAVEE, Y., SU, S., BROWN, P. AND DOHERTY, W. Familial, interpersonal, intrapersonal correlates of drug use: A longitudinal comparison of adolescents in treatment, drug-using adolescents not in treatment, and non-drug-using adolescents. *Int. J. Addict.* **23**: 1211-1240, 1988.
- NEWCOMB, M.D. Understanding the multidimensional nature of drug use and abuse: The role of consumption, risk factors, and protective factors. In: Glantz, M. and Pickens, R. (Eds.) *Vulnerability to Drug Abuse*, Washington, D.C.: American Psychological Association, 1992, pp. 255-297.
- NEWCOMB, M.D. AND BENTLER, P.M. Frequency and sequence of drug use: A longitudinal study from early adolescence to young adulthood. *J. Drug Educ.* **16**: 101-120, 1986.
- NEWCOMB, M.D. AND BENTLER, P.M. *Consequences of Adolescent Drug Use: Impact on the Lives of Young Adults*, Newbury Park, Calif.: Sage Pubns., Inc., 1988.
- NEWCOMB, M.D. AND BENTLER, P.M. Substance use and abuse among children and teenagers. *Amer. Psychol.* **44**: 242-248, 1989.
- NEWCOMB, M.D., BENTLER, P.M. AND COLLINS, C. Alcohol use and dissatisfaction with self and life: A longitudinal analysis of young adults. *J. Drug Issues* **16**: 479-494, 1986a.
- NEWCOMB, M.D. AND FELIX-ORTIZ, M. Multiple protective and risk factors for drug use and abuse: Cross-sectional and prospective findings. *J. Pers. Social Psychol.* **63**: 280-296, 1992.
- NEWCOMB, M.D., MADDAHIAN, E. AND BENTLER, P.M. Risk factors for drug use among adolescents: Concurrent and longitudinal analyses. *Amer. J. Publ. Hlth* **76**: 525-531, 1986b.
- OETTING, E.R. AND BEAUVAIS, F. Peer cluster theory: Drugs and the adolescent. *J. Counsel. Develop.* **65**: 17-22, 1986.

- OETTING, E.R. AND BEAUVAIS, F. Adolescent drug use: Findings of national and local surveys. *J. Cons. Clin. Psychol.* **58**: 385-394, 1990.
- PANDINA, R.J., LABOUVIE, E.W., JOHNSON, V. AND WHITE, H.R. The relationship between alcohol and marijuana use and competence in adolescence. *J. Hlth Social Policy* **1**(3): 89-108, 1990.
- PENTZ, M.A. Social competence and self-efficacy as determinants of substance abuse in adolescence. In: SHIFFMAN, S. AND WILLS, T.A. (Eds.) *Coping and Substance Use*, San Diego, Calif.: Academic Press, 1985, pp. 117-145.
- PETRAITIS, J., FLAY, B.R. AND MILLER, T.Q. Reviewing theories of adolescent substance use: Organizing pieces in the puzzle. *Psychol. Bull.* **117**: 67-86, 1995.
- POGGE, D.L., STOKES, J. AND HARVEY, P.D. Psychometric vs. attentional correlates of early onset alcohol and substance abuse. *J. Abnorm. Child Psychol.* **20**: 151-162, 1992.
- POOLING PROJECT RESEARCH GROUP. Relationship of blood pressure, serum cholesterol, smoking habit, relative weight, and ECG abnormalities to incidence of major coronary events: Final report of the Pooling Project. *J. Chron. Dis.* **31**: 201-306, 1978.
- RICHARDSON, F.C. AND TASTO, D.L. Development and factor analysis of a social anxiety inventory. *Behav. Ther.* **7**: 453-462, 1976.
- ROSENBAUM, M. A Schedule for assessing self-control behaviors: Preliminary findings. *Behav. Ther.* **11**: 109-121, 1980.
- ROSENBERG, M. *Society and the Adolescent Self-Image*, Princeton, N.J.: Princeton Univ. Press, 1965.
- ROTTER, J.B. Generalized expectancies for internal versus external control of reinforcement. *Psychol. Monogr.* **80**: 1-28, 1966.
- RUTTER, M. Psychosocial resilience and protective mechanisms. In: ROLF, J., MASTEN, A.S., CICCHETTI, D., NUECHTERLEIN, K.H. AND WEINTRAUB, S. (Eds.) *Risk and Protective Factors in the Development of Psychopathology*, Cambridge, England: Cambridge Univ. Press, 1990, pp. 181-214.
- SADAVA, S.W. Interactional theories. BLANE, H.T. AND LEONARD, K.E. (Eds.) *Psychological Theories of Drinking and Alcoholism*, New York: Guilford Press, 1987, pp. 90-130.
- SCHEIER, L.M. AND BOTVIN, G.J. Effects of early adolescent drug use on cognitive efficacy in early-late adolescence: A developmental structural model. *J. Subst. Abuse* **7**: 379-404, 1995.
- SCHEIER, L.M. AND NEWCOMB, M.D. Differentiation of early adolescent predictors of drug use versus abuse: A developmental risk-factor model. *J. Subst. Abuse* **3**: 277-299, 1991.
- SCHEIER, L.M., NEWCOMB, M.D. AND SKAGER, R. Risk, protection, and vulnerability to adolescent drug use: Latent-variable models of three age groups. *J. Drug Educ.* **24**: 49-82, 1994.
- SIMCHA-FAGAN, O., GERSTEN, J.C. AND LANGNER, T.S. Early precursors and concurrent correlates of patterns of illicit drug use in adolescence. *J. Drug Issues* **16**: 7-28, 1986.
- SNOW, D.L., TEBES, J.K. AND ARTHUR, M.W. Panel attrition and external validity in adolescent substance use research. *J. Cons. Clin. Psychol.* **60**: 804-807, 1992.
- STACY, A.W., NEWCOMB, M.D. AND BENTLER, P.M. Personality, problem drinking, and drunk driving: Mediating, moderating, and direct-effect models. *J. Pers. Social Psychol.* **60**: 795-811, 1991.
- STEIN, J.A., NEWCOMB, M.D. AND BENTLER, P.M. Personality and drug use: Reciprocal effects across four years. *Pers. Individ. Diff.* **8**: 419-430, 1987.
- VAN HASSELT, V.B., NULL, J.A., KEMPTON, T. AND BUKSTEIN, O.G. Social skills and depression in adolescent substance abusers. *Addict. Behav.* **18**: 9-18, 1993.
- VEIT, C.T. AND WARE, J.E., JR. The structure of psychological distress and well-being in general populations. *J. Cons. Clin. Psychol.* **51**: 730-742, 1983.
- WEBER, M.D., GRAHAM, J.W., HANSEN, W.B., FLAY, B.R. AND JOHNSON, C.A. Evidence for two paths of alcohol use onset in adolescents. *Addict. Behav.* **14**: 399-408, 1989.
- WILLS, T.A. Stress and coping in early adolescence: Relationships to substance use in urban school samples. *Hlth Psychol.* **5**: 503-529, 1986.
- WILLS, T.A. AND SHIFFMAN, S. Coping and substance use: A conceptual framework. In: SHIFFMAN, S. AND WILLS, T.A. (Eds.) *Coping and Substance Use*, San Diego, Calif.: Academic Press, 1985, pp. 3-24.
- WINGARD, J.A., HUBA, G.J. AND BENTLER, P.M. A longitudinal analysis of personality structure and adolescent substance use. *Pers. Individ. Diff.* **1**: 259-272, 1980.
- WINICK, C. Specific targeting of prevention programs in alcohol and drug dependence. *Int. J. Addict.* **20**: 527-533, 1985.
- ZUKEL, W.J., PAUL, O. AND SCHNAPER, H.W. The multiple risk factor intervention trial (MRFIT). I. Historical perspectives. *Prev. Med.* **10**: 387-401, 1981.