

Etiologic Studies of Adolescent Drug Use: A Compendium of Data Resources and Their Implications for Prevention

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Etiological studies canvassing five major domains of risk are reviewed. The five domains reflect unique facets of risk that are central to many current prevention approaches and include: peer social influences, family (parenting) processes, expectancies (cognitive motivations), social skills and personal self-management strategies, and personality factors. Each domain is discussed with regard to major theoretical issues, important studies that help to clarify risk mechanisms, and major findings. A sixth area covering studies of multi-ethnic youth and ethnic-specific risk mechanisms also is reviewed in the context of augmenting previous empirical findings. A final section addresses two important concerns: (1) the need for a comprehensive model of developmental vulnerability; and (2) utilization of information stemming from a long tradition of developmental etiology to enhance the efficacy of drug abuse prevention.

KEY WORDS: adolescent drug use; review, etiology studies; correlates and predictors; implications for prevention.

The goal of this review is to provide a single resource reflecting state-of-the-art research findings related to etiologic studies of adolescent drug use. Toward this end, five main areas of historical interest in drug etiology are systematically, albeit briefly, explored with the intent to clarify important methodological, conceptual, and theoretical concerns. The five areas or domains covered in this review are not exhaustive but include: (1) personality factors (e.g., self-esteem, risk-taking, temperament, conventionality [deviance]); (2) parental and family

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socialization processes (e.g., family management, family communication, family discipline, family organization, family structure); (3) peer social influences (e.g., social network analyses, peer selection, peer socialization, and deviant peer bonding); (4) social skills (e.g., drug refusal skills, assertive skills, resistance skills) and personal self-management strategies (e.g., perceived mastery and self-efficacy, perceived control, self-reinforcement, decision-making skills, coping skills); and (5) expectancies (i.e., drug-related cognitions, perceived functions, beliefs regarding drug effects, and cognitive motivations). A sixth area that generalizes across the previous domains includes studies of multi-ethnic youth or ethnic-specific studies of vulnerability.

STRUCTURE AND RATIONALE FOR BUILDING A COMPENDIUM OF ETIOLOGY STUDIES

There exists no single best way to canvass all of the known and published etiologic studies. It would be a Herculean task to even list all of the etiology studies that cover even a few of the selected domains of risk. Such an enterprise would fill volumes and not fit the intent or mold of how this review is structured. Rather, many of the studies presented reflect a broad cross-section of the full body of knowledge that is available in the literature. To hone down the complete set of studies (as though such a body of knowledge exists), a continually refined selection process resulted in the inclusion of certain studies coupled with the exclusion of a number of rigorously conducted studies. Selection criteria included: the diversity (and uniqueness) of measures, sample characteristics (race, gender, age, regional location, demographic representation), publication record (the investigator has sufficiently mined the data), and direct relevance to current models of prevention. In some cases, findings from short-longitudinal studies covering at most one year are reported; however, despite the study's brevity the data include an interesting array of measures and captured a unique feature of developmental etiology. In other cases, the sample is relatively large (N over 2000), contain multiple cohorts, the data extend over several years during adolescence, the assessments are relatively unique, and publications show the investigator addresses pressing concerns for primary prevention.

With a few exceptions, prevention-based studies were largely excluded from the review process. This was not an easy decision, particularly because prevention studies benefit etiology by providing vast amounts of data on normative development (e.g., Marks, Graham, & Hansen, 1992; Scheier & Botvin, 1998; Scheier, Botvin, Diaz, & Griffin, 1999; Scheier, Botvin, & Baker, 1997). Most notably, group-randomized, school-based drug abuse prevention studies usually include a cohort of untreated or minimal-contact students that are not exposed to the intervention. Like their experimentally-treated counterparts, control students are tracked longitudinally over multiple years and provide a very cost-effective and informative

means of examining normative development and drug etiology. As part of their ongoing prevention activities, the Center for Substance Abuse Prevention (CSAP) is cataloguing prevention studies as part of the National Prevention System (NPS) and the National Registry of Effective Prevention Programs (NREPP). The NPS data registry catalogues all Federal, state, and local government-funded and privately sponsored prevention programs. The NPS website will soon provide access to this information (www.preventionsystem.org). The NREPP contains a subset of the NPS database programs and reflects those trials that are evidence-based and have undergone formal evaluation. The rigorous scientific criteria outlined by CSAP for inclusion in the NREPP make it almost a foregone conclusion that most group-randomized trials will be represented in this database. Thus, researchers will have access to pertinent information on the control students (sample size), assessment strategies (method of data collection), recruitment practices, research design (true vs. quasi-experimental with or without random assignment), measures, data analysis strategies, and target outcomes.¹

In addition to these concerns, the current review does not showcase several major longitudinal studies that include large nationally representative samples such as the Monitoring the Futures Study (MTF) or the National Longitudinal Survey of Youth (NLSY). The MTF contains a small longitudinal component that tracks a subset of secondary school students through young adulthood (e.g., Schulenberg, Wadsworth, O'Malley et al., 1996) and the NLSY contains items tapping drug use that is augmented by assessments of psychosocial functioning and health. Rowe, Vazsonyi, and Flannery (1994) provide an excellent example of how to explore the NLSY data to better understand ethnic and minority-specific developmental risk mechanisms in the etiology of early-stage drug use. In particular, the NLSY, which relied on stratified, probability sampling methods, contains a rich set of reliable measures collected on a geographically diverse, racially heterogeneous sample. These and other government-funded data sets are generally accessible through the principal investigators and also may be available at a very reasonable cost through a national archival resource called the Inter-University Consortium for Political and Social Research.²

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²The Inter-University Consortium for Political and Social Research (ICPSR) can be accessed through a number of university locations, one of which is the Institute for Social Research at the University of Michigan, Archives Development, 124 Borders Building, Ann Arbor, MI 48106-1248, phone: 734-998-9820. A number of important studies are housed by the consortium including the Drug Abuse Treatment Outcomes Study (DATOS), Treatment Episode Data Set (TEDS), National Pregnancy and Health Survey (NPHS), Drug Abuse Warning Network (DAWN), National Longitudinal Survey of the Work Experience of Youth (NLSY), and National Household Survey on Drug Abuse (NHSDA), to name just a few. Data can be downloaded in electronic form from the URL address: <http://www.icpsr.umich.edu/SAMHDA>. The author obtained his dissertation data from this source and examined etiological models using data from the Napa Project, a prospective, school-based drug abuse prevention trial funded by the National Institute on Drug Abuse.

Several issues were considered in the cataloguing process as this review was undertaken. Many studies focused almost exclusively on one or two areas of concern, whereas others opted for a broader approach and considered a wide range of precursors and explored their statistical linkages to drug use. Furthermore, the use of different methodologies, coupled with varying analytic, design, and assessment strategies can render it logistically difficult to summarize studies and synthesize their findings. In consideration of these pertinent issues, a categorization framework based on current trends in primary prevention was applied to help summarize relevant findings. Within each domain, major etiologic studies are reviewed with specific attention paid to: (1) relevance of major findings and their implications for primary prevention; (2) demographic features of the sample including racial heterogeneity, gender composition, participant age range, and sample size; (3) assessment strategies and focal measures; and (4) structure of the data including longitudinal design considerations and research protocols. It is worth noting that this process is not meant to be exhaustive with regard to presenting detailed empirical findings regarding the determinants and consequences of early adolescent drug use. Recent scientific publications, particularly reviews conducted by Hawkins, Catalano, and Miller (1992) and Petraitis, Flay, and Miller (1995) provide excellent sources to access information pertaining to important etiologic studies [see also, Kim, McLeod, Williams, & Hepler (2000) for discussion of broad theoretical considerations related to current prevention efforts and Newcomb & Bentler (1988a) for a cogent review of major etiologic theories].

HIGHLIGHTING INVALUABLE GAINS FROM ETIOLOGY

Etiology studies of normative development have long provided a firm foundation on which to construct sound primary prevention theory, research, and practice (e.g., Botvin, 1995). Longitudinal studies of adolescent development, in particular, have been fundamental in their ability to inform prevention with respect to the major determinants of drug use and these studies hold a prominent position in the development of rational and sound interventions to reduce drug use. Over the past decade or so, greater investment in understanding the role of specific risk factors has created opportunities for the successful development and implementation of a number of school-based interventions to reduce early-stage drug use. Large-scale evaluations of several independent group-randomized prevention field trials have been encouraging (e.g., G. Botvin, Baker, Dusenbury, E. Botvin, & Diaz, 1995; Ellickson, Bell, & Harrison, 1993; Pentz et al., 1989) and provide hope that our national public health agenda for zero tolerance of drug abuse can be readily achieved (Department of Health and Human Services, 1990; Office of National Drug Control Policy, 1997).

Coupled with important theoretical refinements, perhaps the most important gain in the past few years has been the advent of new statistical modeling techniques, fueled in part by rapid advances in statistical theory and the unparalleled

development of computerized statistical software packages. Together, these new tools have helped to reshape data analysis and improve our ability to test complex multivariate and developmental models. One opportune example of how statistical advances can reshape our thinking on important etiologic issues concerns the use of growth modeling to appreciate the role of developmental change. Several investigators have applied these techniques to obtain a more refined understanding of growth in alcohol (Curran, Stice, & Chassin, 1997; Scheier, Botvin, Griffin, & Diaz, 2000; Wills & Cleary, 1999) and drug use (Brook, Whiteman, Finch, Morojele, & Cohen, 2000; Duncan, Alpert, Duncan, & Hops, 1997). In all of these cases, the researchers revisited some very important conceptual and methodological concerns regarding dynamic factors underlying alcohol and drug involvement.

The application of growth curve modeling represents only one of many technical advances that have helped to reshape our understanding of the complexity of alcohol and drug involvement. As researchers begin to expand their horizons with regard to data collection, a larger etiologic picture is taking shape, one that posits a role for environmental and familial factors. In light of this expanded view, several recent studies have collected interview and self-report data from focal adolescents as well as from their immediate families. This approach enables researchers to establish a more formidable link between family characteristics (e.g., parental communication and monitoring, attitudes, and behavior), and youthful drug abuse. The family represents one of many proximal environmental factors that influence vulnerability, and researchers also have begun to examine the role of contextual factors including the influence of neighborhood characteristics (e.g., poverty, crime, and social cohesion) on a broad class of developmental outcomes (e.g., Brooks-Gunn, Duncan, Klebanov, & Sealander, 1993; Durant, Cadenhead, Pendergrast et al., 1994; Paschall & Hubbard 1998) including drug use (e.g., Ennett, Flewelling, Lindrooth, & Norton, 1997; Gottfredson, McNeil, & Gottfredson, 1991). Efforts to better understand how contextual forces shape vulnerability are strongly supported by theory but raise unusual challenges for conducting conventional statistical analyses.

For several reasons then, it is prudent to create a compendium or resource guide that lists available etiology studies. Such a catalogue can provide researchers with quick access to valuable archived data sets that can be used efficiently to help fuel methodological and technical advances. A second important reason for documenting and preparing a compendium of etiology studies suggests that in many cases the activities and interests of researchers are framed partly by the public health agenda. In many instances, researchers collect vast storehouses of information detailing many diverse facets of development but focus almost exclusively on a few particular areas of concern. This is only natural in light of the importance and governing strength of federal and philanthropic funding mechanisms. However, at some level good science transcends historical urgency and includes the promise of creative thinking. New techniques present new opportunities to test

old theories and create fresh insight with regard to factors influencing vulnerability and resilience. Coupled with new insight and fresh perspectives is the accrual of new statistical techniques that permit additional data snooping and exploration. In many instances, researchers collect a broad array of measures but focus on a few areas of concern tethered to their original research concerns. Thus, it is almost compelling that researchers shed new light on old data by incorporating recent theoretical initiatives with methodological and statistical advances. Once we begin to appreciate more fully the strength of these advances we can utilize them to our advantage and refine further our understanding of the complete set of factors that foster vulnerability to drug use and drug-related consequences. Tables concerning data resources, sample characteristics, assessment procedures, and study protocols are available in tabular form from the author.

PERSONALITY FACTORS

Studies examining linkages between personality factors and drug use have identified a number of distinct characteristics that differentiate drug users from non-users. Several of the most noted factors include self-esteem, sensation-seeking, impulsivity, rebelliousness, conventionality, depression, anxiety, poor emotional control, and various facets of intrapersonal relations (e.g., aggression). Jessor and Jessor's (1977; Jessor, Donovan, & Costa, 1991) classic longitudinal study (still underway) is unique in the length of time the participants have been followed (over 30 years), its rich theoretical base, and the diverse nature of social psychological measures tapping three major conceptual domains relevant to adolescent development (personality, perceived environment, and behavior). When taking stock of this important and influential study, it is essential to realize the study's historical context, being one of the first longitudinal efforts to understand adolescent development and coming at the tail end of the 1960s counter-culture revolution. The historical impetus provided by social and political forces operating at that time helped to shape the investigator's emerging focus on measures reflecting: (1) the values of youth; and (2) control factors that regulate transgressions against the social order. As a result, the investigators included self-esteem, alienation, and social criticism as measures of personality and personal moral standards and religiosity as indicators of personality controls.

According to the social-psychological framework proposed in problem-behavior theory, the personality system is comprised of three individual, albeit integrated, structures including *motivational-instigation*, *personal belief*, and *personal control*. The motivational instigation structure involves directedness or goal orientation and includes values on and expectation of academic achievement (orientation toward conventional goals), independence (concern with personal autonomy and movement away from parental control), and peer affection. Personal belief is somewhat more distal than the proximal instigations and consists of cognitive controls

that serve as restraints to engage in nonconformity. Among the key indicators of personal belief are social criticism, alienation, self-esteem, and internal-external locus of control. Personal control consists of variables hypothesized to more directly influence problem behavior (in contrast to personal beliefs) and includes attitudinal tolerance of deviance, positive and negative functions associated with problem behaviors (i.e., reasons for engaging in drug use), and religiosity. An important distinction between elements of the personality structure rests on whether relevant measures reflect *instigations* (promote problem behavior) or *controls* (regulate against deviance) and their location in causal space (distal vs. proximal). Developing a more complete understanding of the complexity of each structure and their dynamic relations goes far beyond the intent of this review; however, it is useful to examine the predictive validity of personality measures in terms of their ability to account for problem behavior (i.e., theoretical consonance).

Using a posteriori categorical groupings designating use and nonuse, Jessor and Jessor reported that certain personality factors were related to transition proneness (i.e., moving from a lower level of drug involvement [non-use] to a more involved stage [use]). For instance, among measures of the personality system (and for the junior high school sample, corresponding to early adolescence), females who transitioned to marijuana use reported lower value on academic achievement, higher value on independence, higher alienation, greater tolerance of deviance, and perceived more positive functions relative to negative for drug use. The same set of finding emerged for models predicting alcohol transition proneness, however the results were stronger for males. Analyses also were extended to include time of onset to determine whether early onset was associated with particular personality profiles. Overall, value on academic achievement, expectation for academic success, and the discrepancy between independence and achievement positively predicted later onset for the high school sample.

Jessor and colleagues have since conducted additional longitudinal studies relying on similar theoretical insights and implementing parallel research protocols (Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Jessor, Turbin, & Costa, 1998). Using four waves of data from a middle school sample and applying a risk factor methodology (an analytic framework borrowed from epidemiology that indexes individual differences in risk or protection), Jessor et al. reported that, controlling for early problem behavior, risk, and demographic characteristics (i.e., gender, race, and SES) early protective influences reflecting positive controls (e.g., positive orientation to school and health, and intolerance of deviance) predicted uniquely decreases in multiple problem behaviors over one, two, and three years. Unfortunately, the precise influence of the personality measures cannot be discerned from other important regulatory influences when a risk factor methodology indexing level of susceptibility is used (the authors do “unpack” the individual risk factors from their respective indices in one set of analyses; and report an almost twofold increase in predicted variance compared to the cumulative risk approach).

A unique and compelling feature of the Rocky Mountain study is the long-term follow-up of the junior high school cohort (and college cohort) into the life period encompassing young adulthood (the mid-twenties for the junior high cohort and late 30's for the college freshman cohort: Jessor, Donovan, & Costa, 1991). These data supply an important opportunity to address questions regarding stability of behavior (continuity vs. discontinuity), how transitions from adolescence to young adulthood influence the expression of problem behaviors, and how early instigations and controls help to shape later behavior. With respect to the ability of personality during adolescence to forecast later behavior in young adulthood, several interesting findings are worth noting. First, the magnitude of long-term associations between elements of the personal belief structure (social criticism and alienation) and an index of multiple problem behaviors were stronger than corresponding elements of the motivational-instigation structure (value and expectation on achievement). Moreover, the magnitude of relations between elements of the personal control structure (tolerance of deviance, religiosity) and problem behavior was more substantial than either of the other two personality structures. Most of these patterns held up even with the individual elements of problem behavior (e.g., alcohol, marijuana, general deviance). Longitudinally speaking, personality proneness (high value on independence, low value on achievement, high social criticism, low self-esteem, and low attitudinal intolerance of deviance) predicted significantly to later problem behaviors (1981 assessment) both for men and women, respectively (accounting for 11–16% of the criterion variance independent of the other systems).

Additional seminal work identifying linkages between personality and drug use stems from the work of Brook and colleagues (Brook & Brook, 1988; Brook, Gordon, & Whiteman, 1985; Brook, Whiteman, Gordon, & Cohen, 1986; Brook, Whiteman, Nomura, Gordon, & Cohen, 1988). These authors tested integrative models encompassing personality, family, and peer domains of risk using a variety of assessment strategies. For instance, a short-longitudinal study that included interviews with focal adolescents and separately with their mothers indicated that during preadolescence measures of unconventionality including deviance, tolerance for deviance (attitude), noncompliance, rebelliousness, and lack of responsibility were related to reported levels of alcohol use. Social inhibition, interpersonal difficulties, pathology, poor ego integration, and impulsivity also predicted early alcohol use. Among the parental measures, poor parental identification, mother-child conflict, and lower reported paternal affection predicted alcohol use over a two-year period. Among the older adolescent subjects, low school achievement, deviance, tolerance of deviance, noncompliance, rebelliousness, lack of responsibility, and reluctance to attend school were related significantly to reported levels of alcohol use, as were poor ego integration, pathology, and low self-esteem. Interestingly, regression models indicated that the domain of personality measures predicted significantly levels of alcohol use, controlling for peer and family influences

during preadolescence but not in later adolescence, where both personality and peer domains predicted significantly alcohol involvement.

Separately, Brook and colleagues (Brook et al., 1982) reported that personality variables influenced drug use indirectly through characteristics of the peer group. In one study consisting of data obtained from mothers and their paired offspring, Brook et al. (1988) reported that low social inhibition was related to frequency of marijuana use over an eight-year period. All 13 measures of a dimension assessing conventionality at Time 2 (ages 13–18) were related significantly to reported levels of marijuana use (also at Time 2). Hierarchical regression models to test mediation (Time 2 mediates influence of Time 1 measures on Time 2 drug use) indicated that personality measures predicted significantly marijuana use controlling for Time 1 measures of the child's ecology, parent-adolescent relations, and personality (multiple R for this equation was 54%).

Based on these and related studies, Brook and colleagues conclude that introjection of conventional parental values and warm and affectionate bonds with family insulate youth from association with deviant peers. Children with poor emotional control, whose mothers were punitive, and reported weak ties to the community themselves reported higher rates of drug use. One of the points raised by Brook is that fundamental aspects of the family (i.e., communication, conflict, modeling) remain relatively stable over time. Thus, poor parental monitoring and communication coupled with high conflict in the home paves the way for disruptive behaviors (i.e., aggression and drug use). It also is important to note that many of the early childhood factors were not associated significantly (and directly) with later measures of psychosocial functioning, indicating that the influence of early childhood characteristics manifest through later adolescent domains. What is perhaps most compelling from these studies is the recognition that dissecting the relative influence of family and personality may be difficult given the crucial role family plays inculcating behavioral styles and the strength of family ties in providing a wide range of intrapersonal and interpersonal reinforcement contingencies (see also, Brook et al., 1988). Although the work by Brook and colleagues was cast intentionally under the rubric of personality, their investigations fit equally well in a section highlighting family processes. In fact, the integration of family socialization practices and personality conducted by Brook and colleagues provide a useful guide to explore how parent-child relations afford protection with youth characterized by difficult personalities.

A review of the relations between personality and drug use would be remiss if it did not include a reference to the seminal studies conducted by Smith and Fogg (Smith & Fogg, 1978; Smith & Fogg, 1979; Smith, 1986). These studies encompassed annual school-wide assessments of students in grades four through 12 from 1969 through 1972. For every cohort of 12th graders lost to matriculation, a new 4th grade cohort was recruited. Longitudinal follow-up included repeated assessments on a wide range of measures included in a 400-item self-report questionnaire.

Smith and Fogg focused primarily on personal competence (e.g., persistence, orientation toward achievement, and self-sufficiency) and social responsibility (e.g., obedience, consideration for others, and self-control) as antecedents to drug use. Overall, these investigators showed that users and nonusers could be distinguished statistically on the basis of important personality characteristics. For instance, using drug use/nonuse categorical groupings over time these authors reported that nonusers who remained nonusers scored highest on obedience and lowest on rebelliousness. In contrast, those students reporting experience with drugs at Time 1 scored lowest on obedience and highest on rebelliousness. Peers rated nonusers higher in tenderness, obedience, and lower in impulsiveness and sociability, compared to early and late users (results specific to marijuana).

Perhaps one of the most well identified personality risk measures is sensation seeking (Stacy, Newcomb, & Bentler, 1993; Barnea, Teichman, & Rahav, 1992; Teichman, Barnea, & Ravav, 1989a,b; Wills, Vaccaro, & McNamara, 1994; Zuckerman, 1979). Sensation seeking is a broad catchall with many terms used interchangeably to describe this personality dimension including impulsivity, behavioral undercontrol, and risk-taking. High sensation seekers do things on a dare, are adventure seeking, and act impulsively to fend off boredom. A long-standing interest has been to establish whether sensation seeking prompts drug use as a form of escape from conventional lifestyles. Using data from a sample of Israeli youth, Teichman et al. (1989a, 1989b) differentiated nonusers, initiators (commenced use over a 12-month period), and stable drug users on the basis of sensation seeking. Compared to a host of personality measures including depression and anxiety, sensation seeking accounted prospectively for the largest variance in drug use. Interestingly, adolescents with high scores on anxiety and depression reported greater use of mood-enhancing drugs (psychoactive substances). Barnea et al. (1992) showed that sensation seeking uniquely and prospectively predicted drug use controlling for perceived peer and parental use, knowledge of drugs, and attitudinal measures. Behavioral intentions and adolescent attitudes mediated the effects of sensation seeking on later drug use.

Newcomb and colleagues (1988) have collected extensive longitudinal information regarding determinants of drug use as part of the University of California, at Los Angeles, Center for the Study of Adolescent Growth and Drug Abuse Etiology. This study has followed a cohort of middle school youth from age 13 through adulthood (35 years of age) using an extensive battery of items tapping psychological, health, personal, family, interpersonal, and work-related functioning. Among the numerous publications to originate from this study, several have implicated sensation seeking as a prospective predictor of drug use. Stacy et al. (1993), for instance, examined the prospective prediction of drinking problems (e.g., social, work, and personal), drunk driving (driving while intoxicated), and alcohol use from cognitive motivations and sensation seeking over a 9-year period. An interesting and unique feature of this study included the differential prediction of problem consequences by cognitive anticipations and personality characteristics, a procedure that

can lead to the identification of high-risk individuals. Overall, a general tendency toward sensation seeking (i.e., thrill or adventure seeking) remained relative stable over the 9-year period and predicted later alcohol use and cognitive motivations. Specific or nonstandard effects in their final model also included positive paths between early (adolescent) disinhibition and later DWI behavior, thrill and adventure seeking and later work-related problems, sensation seeking (general) and later physical personal problems associated with drinking, social cohesion and work-related problems, and disinhibition and later motivations to drink including enhancing positive affect.

In an interesting twist on longitudinal etiology, Stacy, Newcomb, and Bentler (1991a, 1991b) examined the long-term influences of early drug use on later sensation seeking. A consequence model provides a useful approach to detect the influence of early drug involvement on later personality. To model causal relations effectively, these authors included appropriate controls for early sensation seeking, social conformity, emotional distress, drug use, social support, and peer deviance (i.e., as baseline controls for the consequent measures). Interesting findings included positive paths from early adolescent marijuana use to later experience seeking and thrill and adventure seeking, and a path from early cocaine use to later thrill and adventure seeking. Additional longitudinal findings from this laboratory highlight an important role for personality factors in the etiology of work problems, health, drug use, social support, family and relationship problems (Newcomb & Bentler, 1988a; 1988b). For instance, Stein, Newcomb, and Bentler (1987a) examined the influence of personality on drug use over a four-year period and likewise Stein, Newcomb, and Bentler (1987b) reported on an eight-year investigation of the influence of personality on drug use. In the four-year study, these authors reported that conscientiousness, extraversion, self-esteem, and social conformity were associated with decreased beer and marijuana use for males and social conformity was associated with increased wine use among females. In the eight-year study, these investigators reported that early social conformity (i.e., law abidance, liberalism, and religious commitment) was associated inversely with self-reported drug use, perceived peer and adult drug use (negative) over an initial four-year period, which subsequently influenced later drug use (over an additional four-year period). Interestingly, early personality was not associated significantly with drug use at the eight-year follow-up assessment. One mechanism to account for these relations suggests that personality enhances peer selection (rebellious individuals select deviant friends) and encourages specific adult influences that can inoculate youth from drug use.

Much of the work cited above stems from the development and refinement of a comprehensive domain model of drug use (Huba & Bentler, 1982), which structured personality as one facet of the intrapersonal system (i.e., reflecting psychological status) that interacts with biological, interpersonal, and sociocultural systems to produce deviant and drug-taking behaviors. Efforts to test specific model predictions included examination of four-year longitudinal data during early

adolescence, which indicated moderate prediction between personality measures and drug use. A series of setwise canonical correlation analyses indicated that early personality (e.g., congeniality, deliberateness, diligence, extraversion) was associated significantly with later drug use and the pattern of this relation was consistent regardless of the order of variance partitioning. That is, early drug use was related to later personality controlling for early personality and likewise, early personality was related to later drug use, controlling for early drug use (see also, Wingard, Huba, & Bentler, 1979; 1980).

Additional studies have identified self-derogation (i.e., an affective component of self-esteem) as an important determinant of early-stage drug use (Kaplan, 1980; Kaplan, Johnson, & Bailey, 1988; Kaplan & Lin, 2000; Kaplan, Martin, & Robbins, 1982; 1984). Guided primarily by social control, strain, containment, and subcultural perspectives, self-derogation theory essentially casts an individuals' evaluation of the self (i.e., identity) in the context of group membership. Self-derogation theory proposes that conventional behavior, motivation to conform, and strong emotional ties to primary agents of socialization dissuade youth from engaging in deviant acts and bonding with deviant prone peers. On the other hand, negative self-attitudes that stem from rejection by conventional agents (i.e., school or friends) are disruptive emotionally. As a means of coping with and reducing feelings of self-rejection, self-derogating youth move away from the basic normative structures and valued attributes that contribute to their despair. In a sense, youth who experience self-rejecting attitudes that stem from comparisons with other valued peers, attempt to minimize feelings of distress by rejecting conventional values and mainstream peer groups. Once this occurs, new and more deviant behavioral standards emerge and, when coupled with motivations for self-acceptance, drug use becomes an available option for maintaining satisfactory peer relations (see also, Kaplan & Lin, 2000).

Over the course of several investigations, Kaplan and colleagues have shown that self-derogation contributes uniquely to drug use. In many instances, this effect was not direct, but rather mediated by felt rejection at the school, peer, and family level. Early levels of felt rejection at the school, family, and peer level also inculcated negative self-attitudes and fostered adoption of deviant friends. In an elaboration of the self-esteem enhancement hypothesis, Kaplan et al. (1988) reported the influence of early self-rejection (i.e., negative self-attitudes combined with felt rejection by parents and teachers), on later drug use was mediated by negative social sanctions (e.g., stigmatizing social labels derived from being suspended and coming in contact with authorities), disposition to deviance (e.g., disaffection with conventional order), and perceived drug use among peers. Additional studies have confirmed empirically these relations and provided support for a self-derogation model (e.g., Vega, Apospori, Gil, Zimmerman, & Warheit, 1996).

The Rutgers Health and Human Development Project followed three independent cohorts of youth ages 12, 15, and 18 through adulthood. Sample participants

and their families were recruited through random telephone calls made throughout New Jersey with an overall 40% participation rate (inclusion criteria specified absence of a language barrier, serious mental and physical handicaps prohibiting testing, or treatment for psychological problems). Intensive interviews conducted on-site gathered self-report, behavioral (task performance), and physiological measures. Over the initial three-year period, adolescents who were cast as heavy drug users (a composite of alcohol, cigarettes, marijuana, cocaine, and drunkenness averaged over the three-year period) reported relatively higher levels of autonomy, exhibition, impulsivity, and play scores, and lower achievement, cognitive structure, and harm avoidance scores based on an abbreviated version of the Jackson Personality Research Form (Labouvie & McGee, 1986; Labouvie, 1986; 1987; Labouvie, Pandina, & Johnson, 1991). Additional longitudinal studies from this group have shown that users of alcohol and marijuana score higher on various personality indices including dominance, aggression, disinhibition, emotional outbursts, and experience seeking and lower on calmness and emotional stability compared to nonusers (Labouvie, 1990). Using a portion of these longitudinal data, Bates and Pandina (1989) showed that change in personality status through early adolescence predicted substance use involvement for males, but not females.

In an important twist on longitudinal methodology, Labouvie et al. (1991) make the point that conventional regression methods tend to deal with subjects whose scores are homoscedastic, or distributed evenly about the best-fitting least squares regression line. However, participants in their study who present the most challenge, are those who score very low in drug use (exhibiting conventional behavior) or very high in drug use (showing the most deviation from the norm). Using time-averaged measures (averaging over two waves from age 15 to age 18) and difference scores (differences between age 18 and age 15) of personality including self-control, impulsivity, disinhibition, self-esteem, and prosocial self (e.g., gentle, warm, and kind), combined with measures of stress, personal satisfaction, family use, parent and peer relations (e.g., warmth and affection), and school-related variables (aspirations and performance), Labouvie et al. showed that chronic impulsivity predicted drug use at age 15, while chronic disinhibition and changes in disinhibition over time predicted drug use at age 18.

PARENTAL AND FAMILY SOCIALIZATION PROCESSES

Studies of familial influences and drug use have concentrated mainly on the role of parenting style (e.g., permissive, punitive, control techniques), parental monitoring, family communication, parental attitudes, tolerance of deviance, and behavioral modeling (for a good review of the relations between parenting and adjustment see: Steinberg, Mounts, Lamborn, & Dornbusch, 1991 and Darling & Steinberg, 1993. For a review of family practices and substance use see: Glynn, 1984 and Windle, 1996). Establishing relations between family management

practices (e.g., communication with offspring, positive reinforcement of behaviors in the home, and implementation of effective discipline) has been a cornerstone of the social interactional theory outlined by Patterson and colleagues (Patterson, 1986; Patterson, Southamer-Loeber, 1984). Unfortunately, their work has focused almost exclusively on broadly defined clinical outcomes including antisocial behavior and delinquency and focused less specifically on the criterion of drug use. In addition, many studies documenting associations between parenting practices and substance use are primarily cross-sectional and this limits making any strong causal inferences. Only recently have investigators examined the long-term relations between a wide range of parenting practices and drug use and as a result been able to provide an empirical base from which to draw parallels with findings from clinical research (Chassin, Curran, Hussong, & Colder, 1996; Johnson & Pandina, 1991; Needle, Su, & Doherty, 1990; Stice & Barrera, 1995; Stice, Barrera, & Chassin, 1993).

Chassin and colleagues have conducted a longitudinal study of family parenting practices and youthful drinking and drug use (Chassin et al., 1996; Curran, Stice, & Chassin, 1997; Stice & Barrera, 1995; Stice, et al., 1993). A unique feature of this study is the inclusion of clinical diagnoses of parental alcoholism for a subset of youth (using DSM-III, DIS, or FH-RDC criteria). Children of alcoholic (COA) and demographically matched controls were drawn from the general community and both samples provided extensive longitudinal data on a wide range measures (e.g., parental psychopathology, parental support, monitoring, child's mental health, drug use, temperament, negative affect, and life stress to name just a few). Complete and extensive details on the subject recruitment (Chassin, Barrera, Bech, Kissak-Fuller, 1992), study protocols, and interview procedures are available elsewhere (Chassin, Pillow, Curran, Molina, & Barrera, 1993; Chassin, Rogosch, & Barrera, 1991). A wide range of promising parental socialization theories helped to fuel this investigation including social mold (i.e., parents imbue children with maladaptive behaviors through poor parenting practices) and reciprocal effect models (i.e., children's behavior elicits poor parenting practices, which in turn influences child's behavior).

Using one-year follow-up data, Stice and Barrera (1995) reported evidence supporting a reciprocal effects model (adolescent's behavior influences parenting practices as well as parenting practices influencing adolescent's drug use). Moreover, evidence also existed for a direct path from parental alcoholism to later adolescent reports of externalizing symptoms and drug use (controlling for earlier measures of the consequent). Chassin et al. (1996) tested the influence of parental socialization (i.e., impaired monitoring) on later adolescent substance use using growth curve modeling techniques. Using three-year data from the same COA sample ($N = 454$ matched parents/offspring), these investigators showed that paternal alcoholism predicted a steeper rate of growth in alcohol use among their adolescent offspring (compared to the matched controls). Father's monitoring (but not

mother's reported levels of monitoring) predicted negatively initial levels of adolescent alcohol use as well as associations with drug-using peers. Importantly, association with deviant peers mediated fully the effect of parental monitoring on later growth in drug use. Overall, these and related studies using the same cohort of COAs and matched controls have successfully demonstrated the crucial determining role of parental socialization including monitoring practices and history of alcohol abuse (see also Stice et al., 1993).

Johnson and Pandina (1991) used three-year prospective data to show that hostility, lack of warmth, and father's alcohol use were efficient predictors of adolescent self-reported drug use in a community-based sample of adolescents. The Rutgers Health and Human Development Project included three different cohorts who were tracked from ages 12, 15, and 18 through adulthood (other data from subsequent follow-up periods is presented elsewhere in this review). Interestingly, parental alcohol use, tolerance of child's deviancy, and hostility were efficient predictors for males across all ages, whereas, warmth, hostility, and tolerance for deviancy were important for younger females. Labouvie, Pandina, and Johnson (1991) used person and variable-centered analyses to show that parental alcohol use contributes significantly to the early stages of adolescents' alcohol use and that family history of alcoholism and decreases in parental warmth (difference over 3 years) predicted adolescents' self-reported alcohol use. Youth reporting rapid onset to alcohol use and who maintained high levels of reported alcohol use also reported lower levels of attachment to their parents between ages 12 and 15 compared to youth who reported persistently low levels of alcohol use over the year-three period.

Two additional studies from this same group are worth noting. Pandina and Johnson (1989, 1990) reported that youth with a positive history of family alcoholism (i.e., FH+) reported serious alcohol or drug problems at a much higher rate than youth with a negative family history of alcohol abuse (FH-). The supposition is that dysfunctional families transfer inappropriate coping skills to their offspring making it more likely that children of alcoholic parents would themselves use alcohol as a means of coping with stress. Overall, comparisons of independent FH+, heavy parental drinking (no abuse diagnosis), and stressed parent (no alcohol history) groups showed very weak support for any consistent patterns of differences in alcohol (or drug) use or problems related to use on the basis of risk group. There were no gender differences in rates of alcohol-related problems among FH+ males and females. The investigators suggest a more cautious interpretation of the literature regarding FH+ offspring, which has mainly relied on treatment rather than community samples.

A team of investigators at the New York Research Institute on Addictions (Barnes, 1990; Barnes & Farrell, 1992; Barnes, Farrell, & Banerjee, 1994; Farrell, Barnes, & Banerjee, 1995; Barnes, Reifman, Farrell, & Dintcheff, 2000) has reported extensive longitudinal findings related to family influences on alcohol and

drug use (and related problems) in an adolescent sample. Based on family socialization theory, social support, and stress coping models these investigators have shown that family cohesion protects against drug use and delinquency. In contrast to other studies that reported direct main effects of parental drinking on adolescent drinking, Barnes et al. reported this relation was qualified by level of family cohesion. That is, with decreasing levels of family cohesion, fathers problem drinking had adverse effects on the adolescents' deviance and drinking (previously Barnes et al. [1994] reported no main effects for parental history of alcohol abuse or family structure on later drug use over a one-year period). More recently, Barnes et al. (2000) used longitudinal growth-curve modeling to test the effects of parenting practices (e.g., parental control, monitoring, and nurturance) on initiation and development of alcohol misuse. Interestingly, early parental support (i.e., nurturance) had no direct significant influence on later alcohol use, but was mediated entirely through parental monitoring. The sign of the mediated effect indicated that high monitoring was associated with low initial levels of alcohol use and a slower rate of growth in alcohol misuse over time. These investigators also examined the role of early parental alcohol abuse on parenting practices and alcohol misuse among the focal adolescents. Parental alcohol abuse reduced significantly family support and lowered monitoring, which led to subsequent increases in levels of alcohol use and increased the rate of growth in alcohol use.

In addition to assessments of family monitoring, communication, and discipline practices, several researchers have examined whether factors surrounding family structure (i.e., divorce, single-parenting, and remarriage) influence drug use. Stressful events including dissolution of the family may invoke specific coping responses including drug use. Needle et al. (1990) reported that drug use was higher among adolescents from divorced families compared with youth from continuously married families. Over a five-year period, adolescents who experienced divorce in early childhood became more similar in their drug patterns to the group who experienced divorce during adolescence. Controlling for a host of family environment, peer influence, and personal adjustment measures, divorce accounted for significant variation in outcome drug use and consequences of drug use among boys (positive prediction). Additional and intriguing cross-sectional findings comparing rates of self-reported drug use among white and black adolescents of single-mother families and nonresident fathers can be found in Thomas, Farrell, and Barnes, 1996.

Duncan and colleagues modeled the influence of family status on developmental trajectories of adolescent alcohol use with growth curve analyses (Duncan, Tildesley, Duncan, & Hops, 1995). Using a cohort-sequential model with five age cohorts (11–15) and four annual assessments, these investigators reported that family status (single vs. other [blended]) influenced positively individual and family level rates of alcohol use (single-parent families reported drinking more as did step-parent families compared to other family configurations). A unique feature of this

study is the simultaneous modeling of family level alcohol use along with individual adolescent alcohol use and the application of statistical controls for clustering effects (i.e., individuals observed within family units [intact social units] tend to cluster in their behavior more than individuals from different families). Separately, Duncan, Tildesley, Duncan, and Hops (1995) modeled growth in alcohol use over a four-year period and reported that perceived family cohesion decreased initial levels of adolescent alcohol use but did not influence rates of growth.

PEER AND RELATED SOCIAL INFLUENCES

Studies of peer socialization factors have influenced tremendously the field of drug abuse prevention. In fact, it is hard to find an intervention strategy that at some level does not include components that address the magnitude and importance of peer social influences. Seminal studies by Kandel (Kandel, 1986; Kandel & Andrews, 1987) and others (Bauman & Fisher, 1986; Bauman, Fisher, Bryan, & Chenoweth, 1984; Biddle, Bank, & Marlin, 1980a,b; Dishion & Loeber, 1985; Huba, Wingard, & Bentler, 1979; Krosnick & Judd, 1982) helped to shape our current knowledge regarding peer socialization and peer selection processes. Early longitudinal studies by Huba and colleagues (Huba, Wingard, & Bentler, 1980) identified peer social influence mechanisms (perceived peer drug use, peer support, and peers making drugs available) as unique predictors of drug use, controlling for other peer contextual factors (a measure of active peer involvement in school and friendship activities), and early drug use.

More recently, however, researchers have begun to accumulate a more refined understanding of the consistency of peer influences and their relations to various stages of drug use (Aloise-Young, Graham, & Hansen, 1994; Duncan, Tildesley, Duncan, & Hops, 1995; Graham, Marks, & Hansen, 1991; Hansen, Graham, Sobel et al., 1987). Graham and colleagues, for instance, distinguished peer influences on the basis of active versus passive influences. Active influences involve direct offers to use drugs (i.e., being confronted by a friend who offers a cigarette), whereas passive offers refer to the perception of the social acceptability of drug use (i.e., estimating how many of one's friends smoke) and modeling of these normative influences. In contrast to active offers and direct modeling experiences, passive influences involve indirect modeling, casual conversation regarding behaviors, and delayed imitation (discussions regarding the perceived benefits of alcohol use may lead to drinking and be protracted over an extended time period).

Findings indicate that direct offers, friends' self-reported use (i.e., social modeling), and perceptions of friend's use (i.e., normative beliefs) all predict unique components of self-reported alcohol and cigarette use. This pattern of relations held for boys and girls as well as for discrete age groupings (older vs. younger). Aloise-Young et al. linked self-reports of drug use with best friends' reports of drug use using sociometric nomination techniques (three friends were nominated

and their data linked by identification codes). These investigators examined peer influence in the context of smoking initiation and group membership (outsiders with marginal friendships compared to members with close ties). At increased rates of best friends' smoking, group outsiders reported higher rates of smoking. Conditioned probabilities showed that group outsiders with best friends that smoked were twice as likely to smoke than group outsiders with nonsmoking friends. Subgroup analyses showed that peer conformity (concern with best friends reaction toward drug use) conditioned the relations between best friends' smoking and self-reported smoking (i.e., low concern youth smoked more than high concern youth).

Bailey and Hubbard (1991) examined developmental changes in peer factors as a predictor of marijuana use among middle school students. These investigators reported that different quality of friends (peers, friends, adolescents in the neighborhood) hold different sway with regard to influencing marijuana use. For instance, adolescents reported greater perceived marijuana use among students in their immediate environment than close friends and neighborhood youth. At increasing grade levels (a proxy for age), greater numbers of youth perceived their friends as using marijuana. As youth transitioned from nonuse to use, they were more likely to perceive most of their friends using drugs at an earlier point in time. Contingency tables showed a causal ordering from the focal adolescents' change in marijuana use over one-year to an increase in perceived friends' use during the same period. Logistic models showed that change in perceived friends who used drugs (increased friends using) and change in frequency of friends' drug use (more frequent use) efficiently predicted marijuana onset over one year for all grade levels. Thus, close friends played a stronger role in promoting self-reported drug use than school and neighborhood peers.

Curran, Stice, and Chassin (1997) used three-year longitudinal follow-up data to examine bi-directional influences between growth in alcohol use and peer influence. A particular strength of this investigation is its reliance on growth curve modeling to examine developmental trajectories for peer influence and alcohol use. Specifically, their model posited cross-domain relations between early levels of perceived peer alcohol use (occasional and regular drinking) and self-reported alcohol use (frequency, binge drinking, and drunkenness). Adolescent alcohol use was characterized by linear growth over the three-year period and individuals with lower initial levels of alcohol use grew more rapidly in their drinking behavior over time. Perceived peer alcohol use also grew in a positive and linear fashion and those youth reporting lower perceived levels of peer use heightened those perceptions more rapidly over time. When growth functions for peer use and alcohol use were modeled simultaneously (and regressed on age, gender, and parental alcoholism status), a quite different picture emerged. Adolescents with lower initial levels of reported alcohol use tended to increase in their perception of peer alcohol use at a faster rate than youth reporting higher initial levels of alcohol use. Moreover, youth reporting higher initial levels of peer alcohol use increased in their own

levels of reported alcohol use at a much steeper rate. The addition of a measure of rebelliousness did not alter the substantive findings (rebelliousness was related positively to initial levels but not to growth). Overall, these findings provide support for peer socialization as well as peer selection models of adolescent alcohol use. This is because high levels of perceived peer use facilitated growth in alcohol use as much as early levels of alcohol use fostered growth in levels of perceived peer use.

The role of peer groups in the beginning stages of drug use also has been examined from a slightly different perspective. For instance, Ennett and colleagues have provided important insights regarding the role of peer cliques and social networks as they stimulate drug use (Ennett & Bauman, 1996; Ennett & Bauman, 1994; Ennett & Bauman, 1993; Ennett, Bauman, & Koch, 1994). Social network analyses represent a refreshing look at how cliques of friends and the structure of peer groups influence decision-making and drug use. During the formative years of adolescence, youth move in and out of cliques and some youth are not truly members of any one clique. Questions posed by social network analysis relate to differential movement and identification of individuals within defined groups. Isolates, for example, are individuals with no defined membership stake and few linkages with members in any social network. Their location as an outsider can prompt stress and lead to drug use as a form of affect regulation and palliative coping (i.e., this view fits nicely with the basic tenets of self-derogation theory). Clique members on the other hand have strong ties with a small group of well-bounded individuals (moving in and out of the same circle of friends). Liaisons are individuals that have links with other members of different cliques and are characterized by strong peer interactions. Social network analyses contribute to our understanding of whether influence (i.e., socialization processes) contributes to behavioral similarity or whether behavior catalyzes formation of homogenous groups (i.e., a clique of youth all of whom report cigarette use).

Resolution of how social networks form and operate has great implications for the study of drug abuse and drug abuse prevention. Classrooms or whole schools form natural geographic boundaries that help to collectively group social networks generally at younger ages. Friendships in the earlier portions of adolescence are generally formed on the basis of geographic similarity, age, gender, or racial similarity. However, at older ages (i.e., 9th grade) when there is greater movement between social networks, there is greater opportunity for peers to influence behaviors (or vice versa as suggested by peer selection mechanisms).

Results obtained from a series of social network analyses have shown that clique members, liaisons, and isolates differ in their relative odds of smoking cigarettes. A higher proportion of isolates, for instance, reported using cigarettes (21% vs. 6% and 4% for isolates, liaison and clique members, respectively in one school). Logistic models showed these relations remained intact controlling for gender, race, and mother's education. Network isolates were anywhere from 2.9 to 6.5 times as likely to regularly smoke cigarettes than clique members or liaisons (across five different schools). Using a statistical measure of clique homogeneity

in smoking behavior (similar to the intraclass correlation coefficient), Ennett et al. (1994) reported that smokers tended to aggregate within specific cliques (variance within cliques was greater than variances across different cliques), although this finding across five different schools was less consistent for male cliques, entirely black cliques, and cliques with reported high levels of mother's education (reported by mothers). Separately, Ennett and Bauman (1994) examined whether influence or selection mechanisms contribute to the increased homogeneity of clique smoking behavior. This study relied on one-year follow-up data from the 9th to 10th grades. Only liaisons and clique members were examined, because these groups, by their very nature exhibit social ties that permit influence or selection mechanisms (in other words, isolates do not have sufficient contacts or social networks to permit group influence). Findings supported the influence hypothesis and showed that nonsmokers in smoking cliques were more likely to become smokers than nonsmokers in nonsmoking cliques. When cliques survived intact over the one-year period, this effect was even more pronounced. A greater percent of nonsmokers in smoking cliques became smokers than nonsmokers in nonsmoking cliques.

Selection provides that smokers choose other youth who smoke (peer homophily according to Kandel [1986]). This form of behavioral congruence explains to some degree why people choose friends with similar interests. If smoking behavior is regarded as a focal point of similar interest, then friends pick each other on the basis of their common behaviors (i.e., smoking) and peer selection looms as a possible risk mechanism. Ennett and Bauman showed that clique members and designated isolates reporting they smoked cigarettes were more likely to select other clique members or isolates that smoked (55.6% of liaison smokers chose smokers whereas 24.5% of nonsmokers selected smokers).

SOCIAL AND PERSONAL SELF-MANAGEMENT SKILLS

Individual vulnerability to peer influences may be based partly on deficits in social skills or poor self-management strategies. Recognizing the strength of peer social influences combined with models of intrapersonal susceptibility has led to formulation of a wide array of interventions that feature social resistance training, social competence, and personal competence enhancement (Botvin, 1995; 1997; Hansen & Graham, 1991; Hawkins et al., 1992; Pentz, 1985; Petraitis et al., 1995; Schinke, Gilchrist, & Snow, 1985; Shope, Copeland, Marcoux, & Kamp, 1996; Shope, Copeland, Kamp, & Lang, 1998). Much of the theoretical formulation for social skills training programs rests on the foundation provided by social learning theory and the self-efficacy model of human behavior (Bandura, 1977; 1978; 1986). Briefly, this approach suggests that efficacy expectations serve as motivational guides to behavior. When individuals possess a conviction they can successfully engage (i.e., execute) the requisite skills to obtain a specific outcome, this leads to the development of a cognitive schema or mental framework (i.e.,

efficacy expectation or outcome expectation). As similar interpersonal situations arise and demands are placed on the individual, the schema or framework (i.e., belief or efficacy expectation) guides behavior and future action. With respect to developmental vulnerability, students will engage specific drug refusal skills if they maintain the conviction that these skills are effective and can be implemented appropriately. Social resistance/social learning based programs are guided by the premise that many youth lack the requisite skills to offset peer (and other) pressure to use drugs. Strategies to improve resilience include teaching youth effective assertiveness and drug refusal skills, which will diminish the environmental effects harbored by negative social influences to use drugs. Over time, and equipped with a belief they can refuse drug offers without compromising their peer social status, youth will implement resistance skills in appropriate situations (and thereby diminish the impact of peer, adult, and media influences to use drugs). Along with increased utilization of refusal skills, Pentz (1985) has argued that greater assertiveness and improved social interactions promote greater perceived social competence.

Extension of the basic conceptualization of developmental vulnerability to include a wider range of competence-based skills has led to the development of generic, multi-modal prevention strategies (e.g., Botvin et al., 1995; Botvin, 1995; Dusenbury & Botvin, 1992). These approaches consider low self-esteem, social anxiety, poor interpersonal skills, poor decision-making skills, and low self-confidence as factors that heighten susceptibility to health-compromising behaviors (i.e., drug use). Intervention strategies to correct skills deficits include behavioral rehearsal, active role-play, developing cognitive scripts, positive reinforcement strategies, and homework projects that stimulate perceived social self-efficacy. Strategies to improve self-confidence and build perceived competence include goal-setting, practicing self-reinforcement and decision-making skills, setting guidelines for behavior, group discussion of problem-solving strategies, reframing difficult issues, practicing self-statements, and modeling safe verbal and nonverbal practices with peers.

Despite the strength of theoretical arguments and available evidence from prevention programs, there is a paucity of research that examines directly the role of social and personal competence skills on adolescent drug use. Much of the evidence supporting the role of skills in the beginning stages of drug use comes indirectly from studies of treatment populations (e.g., Donohue, Van Hasselt, Hersen, & Perrin, 1999; Hawkins, Catalano, Gillmore, & Wells, 1989; Needle, Su, Doherty et al., 1988), which focus on whether drug use is associated with deficits in cognitive and learning skills. Additional support derives from studies documenting the importance of peer social influences and interpersonal relations (e.g., Ary, Tildesley, Hops, & Andres, 1993; Hansen, Graham, Sobel et al., 1987; Kandel, 1986; Oetting & Beauvais, 1987), suggesting that assertiveness and drug refusal skills might represent an effective deterrent.

Scheier and colleagues conducted extensive analyses of the role of social and personal self-management skills as predictors of adolescent drug use (Scheier & Botvin, 1998; Scheier et al., 1997; Scheier, Botvin, Diaz, & Griffin, 1999; Scheier, Botvin, Griffin, & Diaz, 1999). Much of this work dovetails with ongoing tests of the efficacy of a multi-modal competence enhancement drug abuse prevention trial (Botvin et al., 1995). The intervention program has strong ties to self-efficacy and problem behavior theory and this is reflected to a large degree in the focus on social and personal competence skills as determinants of early-stage drug use.

In one study, Scheier et al. (1997) showed that average or cumulative risk/protection over a three-year period (reflecting chronic features of skill and intrapersonal deficits) predicted significantly alcohol involvement in a sample of middle school youth. Controlling for time-averaged levels of risk and protection, change in risk/protection status over the same three-year period also predicted alcohol involvement and transitions in alcohol use. Specifically, controlling for chronic levels of social influence risk (perceived peer alcohol use), competence risk (e.g., self-management strategies), psychological functioning (e.g., depression), cognitive-affective functioning (e.g., expectancies), and interpersonal functioning (e.g., social anxiety and confrontation skills), increased social influence and increased competence risk predicted significantly alcohol involvement. Chronic features of protection (the piece of the distribution opposite to heightened risk) included psychological and interpersonal functioning. When alcohol use was modeled as a dichotomy reflecting maintained (stable over three years) or exacerbated use (increased over three years), different predictive relations emerged. At the final step in a logistic regression model, and controlling for prior alcohol use, significant predictors of alcohol involvement included chronic social influence risk, psychological functioning, change in social influence risk (increased perceptions of peer use), and change in competence levels (decreased skill level over time). Only chronic psychological protection predicted transitions in alcohol use, controlling for chronic risk and change in risk status.

Scheier and Botvin (1998) also examined the role of social and personal competence skills in alcohol involvement over a three-year period. Using latent variable structural equation modeling, these investigators showed that early levels of competence (decision skills, self-management, and academic esteem) was associated with lower levels of alcohol use from 8th to 10th grade. Early social competence was associated with increased later alcohol use, an indication that socially skilled (efficacious) youth show an inclination to health compromising behaviors. Contemporaneous associations at both the 8th and 10th grades showed that poor social skills were associated with poor competence. More refined analyses that examined conditioned effects showed that academic esteem and decision-making skills buffered the effects of social influence risk (i.e., high peer approval of and perceived drug use) on contemporaneous alcohol use and academic esteem buffered the effects of social influence risk on long-term drinking practices.

Two additional studies from this same group provide unique information with regard to the primacy of skills in alcohol and drug involvement. Scheier and Botvin (1999) examined the role of social skills risk (drug refusal efficacy, social efficacy), competence (academic esteem, self-reinforcement, cognitive mastery, problem-solving confidence), and risk-taking in the generation of early-stage alcohol use. Findings from this three-year investigation showed that controlling for early levels of alcohol and competence, risk-taking predicted later alcohol use, poor drug refusal efficacy predicted later alcohol use, and poor drug refusal efficacy positively predicted later competence. There was no significant effect of early competence on later alcohol use, albeit competence did exert a protective effect contemporaneously at both baseline and follow-up and was associated lower reported levels of alcohol use. Scheier et al. (1999) also examined whether growth in refusal skill efficacy was related to growth in alcohol use over a four-year period (7th–10th grades). Latent growth curve analyses indicated that growth in alcohol use was linear and positive, whereas growth in refusal skills efficacy was characterized by a negative developmental trajectory (mean levels of reported skills declined over time). A significant negative association between initial levels of alcohol use and the alcohol slope factor indicated that more rapid growth over time occurred among youth reporting initially lower levels of alcohol use.

Characterization of growth in refusal skills efficacy was somewhat different. Refusal skills declined over time (means were progressively smaller at each assessment), though there was significant variability around the group growth rate. Individuals with lower levels of refusal skills efficacy in the 7th grade declined more slowly over time (non-significant relation). When the two growth functions were modeled simultaneously, and several time-invariant covariates were included (gender, risk-taking, grades, social efficacy, personal control), a different picture emerged. Specifically, high initial levels of alcohol use increased the rate of decline in refusal skills efficacy. Youth with initially lower levels of refusal skills efficacy grew faster in their reported levels of alcohol use. Overall, as alcohol involvement increased reported levels of refusal skills efficacy declined. Inclusion of several exogenous risk factors that may condition growth also painted a more detailed picture of how vulnerability influences alcohol use and social skills. Risk-taking influenced initial levels of both growth factors, but not growth itself. High grades were protective and softened the decline in refusal skills efficacy and social competence influenced a more rapid acceleration in alcohol use (similar to the finding reported in Scheier and Botvin, 1998). Higher social competence also facilitated a more rapid decline in refusal skills efficacy and self-control (i.e., perceived mastery) was related only to initial levels of alcohol (negative) and refusal skills efficacy (positive).

Inasmuch as the focus of this review attends to the antecedents of drug use, there also is considerable need to examine possible detrimental effects of drug

use on psychosocial functioning (e.g., Newcomb & Bentler, 1988a). Scheier and Botvin (1995) used latent variable structural equation modeling to examine the adverse effects of early-stage drug use on later cognitive efficacy over a five-year period. Early predictors (i.e., control measures) included multiple drug use (alcohol, cigarettes, and marijuana), behavioral control (e.g., fussiness in class, non-compliance, and poor task persistence), and cognitive efficacy (five indicators reflecting cognitive mastery, self-reinforcement, decision-making skills, problem-solving confidence, and self-management strategies). Findings indicated that early multiple drug use decreased the use of self-management strategies (self-statements to reduce anxiety). Early marijuana use decreased use of self-reinforcement strategies and cigarette frequency decreased use of problem-solving skills. Additional long-term associations showed that conventional, diligent, and low sensation-seeking youth reported less multiple drug use overall and higher levels of cognitive efficacy at follow-up. The moderate to strong associations between cognitive efficacy and drug use at both baseline and follow-up led these investigators to conclude that effects of drug use on perceived efficacy are delayed developmentally, but nevertheless present.

Additional intervention-based studies also have produced a modicum of empirical findings attesting to the role of refusal skills in early-stage drug use. Studies of this type are important because they can shed light on the magnitude of relations between skills and drug use and establish a framework for what should be expected following intervention implementation (i.e., if skills are unrelated to actual use, then modification of skills may not alter this relation). Based on data obtained from the Alcohol Misuse Prevention Study, Shope and colleagues (Shope, Copeland, Maharg, Dielman, & Butchart, 1993; Shope Dielman, Butchart, Campanelli, & Kloska, 1992) reported that refusal skills assertiveness using behavioral assessments (role-play with trained confederates) was associated positively with an index of knowledge regarding alcohol misuse (alcohol facts/effects), knowledge of how to resist peer pressure, and internal locus of control for health, and inversely with susceptibility to peer pressure. Among the behavioral outcomes, high refusal skills ratings were associated with lower alcohol use and misuse.

One additional study highlighting the role of skills (among other psychological constructs) is worth noting. Hawkins and colleagues (Catalano, Kosterman, Hawkins et al., 1996; Hawkins & Weis, 1985) have been conducting a longitudinal follow-up of youths participating in the Seattle Social Development Project (SSDP). The SSDP is a comprehensive multi-modal intervention targeting reductions in deviance and drug use. The social development model (SDM) highlights risk factors within multiple domains including the individual, family, school, peer group, and community. The model borrows from control, social learning, and differential association theories in an effort to synthesize the developmental mechanisms that stimulate bonding with primary socializing agents (i.e., family, peers, and school). Secure bonds provide a conduit (behavioral and normative)

to enforce formal controls that regulate behavior, whereas insecure or threatened bonds lead to disenfranchisement, and may even promote deviance. To a large degree, and despite its emphasis on the value structure and normative behaviors of primary socializing units, SDM articulates a prominent role for emotional, behavioral, and cognitive skills as part of an early socialization process that causally motivates later conventional or delinquent behaviors. Through the development of interpersonal and involvement skills, for instance, youth acquire positive reinforcement for pro-social identities. In turn, pro-social behavior promotes attachment and bonding to conventional institutions (e.g., family and school). Youth who lack appropriate skills (i.e., deficiencies in interpersonal awareness), or lack appropriate reinforcement contingencies (i.e., abusive parenting), are likely to select antisocial pathways involving greater perception and opportunities for antisocial interactions, involvement in problem behaviors, attachment to antisocial others and activities, and a belief in antisocial values.

According to SDM, a wide range of academic, emotional control, problem-solving, stress-coping, and decision-making skills help to regulate the development of pro-social behavior. In one published test of SDM, Catalano and colleagues examined the ability of skills in middle school (ages 13–14) to predict drug use in high school (ages 17–18). Controlling for levels of early drug use (ages 9–10), skills for interactions predicted later perceived antisocial rewards (negative) and pro-social rewards (positive). The effects of perceived rewards indirectly influenced beliefs in the moral order (e.g., law abidance) and subsequent drug use (consistent with the manner hypothesized). A more parsimonious second-order model containing higher-order factors capturing pro-social socialization (pro-social opportunities, involvement, and rewards) and antisocial socialization (antisocial opportunities, involvement, and rewards) also showed that early skills influenced indirectly later drug use through socialization, bonding, and law abidance.

ALCOHOL AND DRUG-RELATED EXPECTANCIES

Until recently, there was a dearth of longitudinal studies examining prospective prediction of drug use by expectancies (i.e., also referred to as beliefs, perceived functions, outcome expectancies, and cognitive motivations). However, in the past decade researchers have actively contributed to filling this gap with longitudinal investigations clarifying the role of expectancies in promoting alcohol and drug use. Stacy, Newcomb, and Bentler (1991a), for instance, examined prospective relations between expectancy constructs and alcohol and marijuana use over a nine-year period in a sample of youth tracked from adolescence to young adulthood. Overall, early alcohol motivations (expectancies) predicted later drug problems and early marijuana motivations predicted later drug use quantity and frequency (reflecting intensity of use for multiple substances: alcohol, marijuana, cocaine, and a composite of hard drugs). Effects associated with these significant paths controlled

for early levels of drug use and reinforce the importance of early cognitive motivations (i.e., expectancies) on later behavior. Previously, using a follow-up of 10th through 12th graders, Newcomb, Chou, Bentler, and Huba (1988) identified four specific dimensions of expectancies in an adolescent sample including reducing negative affect, enhancing positive affect and creativity, social cohesion, and addiction. Tests of a higher-order structure (a construct reflecting general motivation to use drugs) posited to statistically “cause” the relations among the four dimensions proved tenable across sex and type of substance motivation (alcohol vs. marijuana). Mean gender comparisons showed girls reporting greater alcohol use associated with affect reduction, despite lower relative levels of alcohol use and boys were more likely to use marijuana for social-cohesion reasons compared to girls. Latent variable structural equation models were constructed separately for boys and girls to determine whether motivations differentially influenced drug use based on gender. Findings for boys indicated that alcohol motivation (expectancies) predicted specifically alcohol use, whereas marijuana motivation predicted general drug use and specific marijuana use. Individual (nonstandard) effects from an indicator of addiction motivations to use alcohol to later alcohol use enhanced the overall fit of the model. The same model fit well for girls, but included a larger stability effect for general drug use over the one-year period.

Researchers also have posited that expectancies are cognitive mediators that serve to “filter” various social learning influences (for a good explanation of the history of expectancy research in the alcohol field see, for example, Smith & Goldman, 1995, for a discussion of relevant measurement issues see, Leigh & Stacy, 1991; 1993, and for a cogent theoretical exposition see, Stacy, Widaman, & Marlatt, 1990). Scheier and Botvin (1997) examined the role of expectancies as mediators of alcohol consumption and social influences in a sample of middle school youth over a three-year period. These authors reported that social reinforcement alcohol expectancies serve as “cognitive facilitators” and mediate the effects of social influences (perceived friends’ attitudes to alcohol and friends’ alcohol use), knowledge (perceived health effects and adult prevalence) and early alcohol use on later alcohol use. An additional and somewhat unanticipated finding from this particular study included a long-term protective effect of early alcohol knowledge on later alcohol use.

Researchers also have distinguished between the relative contribution of positive and negative expectancies (Colder, Chassin, Stice, & Curran; 1997; Leigh & Stacy, 1993; Stacy, Widaman, & Marlatt, 1990). Colder et al. (1997) used a sample of COAs with demographically matched controls to examine the relative unique contribution of positive and negative expectancies on growth in alcohol use. Father’s alcoholism by DSM-III diagnosis (or DIS diagnosis of dependence) predicted positive expectancies, which subsequently predicted higher initial levels of alcohol use (modeled as a growth function). Father’s alcoholism also positively predicted growth in alcohol use over a three-year period as did mother’s alcoholism.

Smith, Goldman, Greenbaum, and Christiansen (1995) examined social facilitation expectancies for drinking as predictors of adolescent alcohol use using a three-wave, two-year panel design. These investigators tested a reciprocal expectancy-drinking influence model by specifying a fully saturated model containing lagged and stability paths between expectancy and drinking constructs at each of the three waves. Interestingly, in comparison to the fully saturated model (with cross-domain lagged effects), alternative specifications fit the data more poorly (i.e., restricting paths between expectancy and drinking to zero to model null effects). Using two holdout cross-validation samples of reported nondrinkers, these authors also showed that social facilitation expectancies fueled growth in reported levels of alcohol use. Interestingly, despite higher reported levels of alcohol use among males, tests for gender differences indicated equivalent factors structures for social expectancies and equivalent parameters in the growth model between males and females.

Grube and colleagues also have tested nonlinear and interactive longitudinal models of alcohol expectancies (Grube & Agostinelli, 1999; Grube, Chen, Madden, & Morgan, 1995). An interesting point raised by these investigators is that most expectancy-behavior models have tested linear effects, whereas theory, particularly the bivalent theory of attitudes, might suggest nonlinear effects. Using a two-wave panel design with middle school youth, these authors found significant positive linear effects for social facilitation and affective enhancement expectancies and a negative linear effect for negative consequences on subsequent drinking. Nonlinear effects were evident for negative expectancies using the cross-sectional portion of their data. Significant interactions also were informative albeit somewhat complex. Drinking was most probable at higher levels of affective enhancement and lower levels of negative expectancies. For the social facilitation \times affective enhancement interaction, drinking was most probable when both positive and negative expectancies were perceived as likely outcomes. When the same analyses were considered for the longitudinal portion of the data, only the linear effect of expectancies in combination with demographic measures (age, sex, race) predicted drinking.

Although the bulk of studies reviewed for inclusion in this review involve longitudinal methodology, additional insight can be obtained from carefully conducted cross-sectional studies. Dermen et al. (1998) used random-digit dial techniques to identify a racially and demographically representative sample of adolescents (13–19 years of age) who were interviewed with respect to sexual activity, alcohol use, and alcohol expectancies. In addition to reporting positive main effects for alcohol use on sexual risk-taking, disinhibition and sexual risk-taking expectancies were associated positively with (sexual) risk-taking. Most importantly, moderator analyses showed that alcohol and risk-taking were more strongly associated among youth reporting higher levels of expectancies for sexual risk-taking (this relation held for first and most recent intercourse experience).

This represents only a very cursory listing of a very productive area of research that has grown exponentially over the past few years. More recent studies

have examined memory accessibility of expectancies using minimal cue implicit cognition tasks (open-ended associative methods using cued recall) where students are asked to list potential outcomes from drinking (e.g., Stacy, 1997; Stacy, Leigh, & Weingardt, 1994) or drug use (e.g., Stacy, Galaif, Sussman, & Dent, 1996; Stacy, Newcomb, & Bentler, 1995) as well as respond to free association methods that rely on semantic priming (i.e., word association procedures). More recently, Fromme and colleagues have extended this very exciting research approach to explore relations between risky sexual practices (i.e., condom use) and alcohol intoxication (Fromme, D'Amico, & Katz, 1999; Fromme, Katz, & D'Amico, 1997). A benefit of these memory accessibility studies is that students are free to generate their own perceptions of drinking or drug use free from research bias (more traditionally encountered with dimensional structured self-report assessments). Spontaneous recall of these perceptions is attributed to implicit memory processes, which are then linked with actual reported levels of alcohol or drug use. Several conclusions can be drawn from these and related studies. First, expectancies elicited using a memory processes approach show strong motivational significance in models predicting alcohol and drug use, even when controlling for other important risk factors (e.g., Stacy, 1997). Second, behavioral experience modulates the association between outcome expectancy and behavior. That is, individuals with more drinking-related experience associate specific outcomes (i.e., relaxation) more strongly with their own and others' behavior, than less experienced individuals. Clearly, the strength of this association serves as a memory cue and may be responsible for instigating drinking. This latter finding also may shed light on the strong autocorrelation observed in many studies between early and later forms of behavior. Third, specific features of personality (i.e., sensation-seeking) moderate the relation between memory accessibility and drinking, for instance, leading to the supposition that personality may factor into the overall learning mechanisms involved in drinking.

Studies of self-generated responses inclusive of memory activation and outcome expectancies for alcohol and drug use may provide a valid means of tapping cognitive sets (i.e., drug-consistent pattern of activation in memory) that activate behavior (i.e., drug use). At a more fundamental level, the neural networks underlying expectancies may, in part, reflect learning processes that indicate how individuals encode reinforcements (i.e., psychopharmacological effects of drinking and physical relaxation) and couple this with actual behavior. A beneficial next step in this research that is certainly fundamental to its heuristic value concerns determining whether these constructs are malleable in high-risk populations (i.e., recovering addicts) using conventional therapeutic interventions. At an even more fundamental level, this type of research can be very informative with respect to refining our basic understanding of how individuals store and retrieve information regarding the consequences of alcohol and drug use acquired in prevention programs.

MULTI-ETHNIC ETIOLOGY STUDIES

A number of studies fall outside the range of the five broad domains of risk that were selected to help guide construction of this review. This occurs largely because the investigators did not identify a particular facet of risk or vulnerability, but rather addressed concerns related to cross-replication of general models of vulnerability across race, gender, or demographics. Most of the reported studies monitor growth and development in a single race group (i.e., blacks: Brunswick, 1988), or conduct comparisons based on a broad catchall of risk factors between white and black (e.g., Gottfredson & Koper, 1996) or Hispanic and white youth (Warheit, Vega, Khoury, Gil, & Elfenbein, 1996).

Brunswick (1988) collected data from a multi-stage probability sample of urban blacks in Harlem, New York and reported long-term effects of drug use on affective well-being (the observed effect was stronger for women). Of particular importance, these authors noted that different substances (e.g., methadone, cigarettes, cocaine) produced different outcomes. Importantly, mediators of drug use for men included social dysfunction, whereas for women social influences, lifestyle, and psychosocial factors influenced subsequent distress. Controls for prior reported well-being and selection effects (i.e., the postulation that sicker people use drugs) ruled out reverse causation and helped support the hypothesized direction of effects (i.e., early drug use produces distress).

Gottfredson & Koper (1996) reported that, with one exception, measurement models capturing latent constructs of risk (i.e., rebellious behavior) and drug use were identical for race and gender groups in a sample of black and white adolescents participating in a school-based drug and alcohol prevention program ($N > 2,000$). The one exception included smokeless tobacco, which loaded more heavily for males than females, and an indicator capturing use of nine illegal substances, which loaded more heavily for white than black youth. For the most part, structural parameters indicated that predictive models (each risk domain was used separately as a predictor) did not differ widely among race or gender groups, though there were some noted race differences. For instance, peer drug use measures were not related significantly to last-year variety of drug use (nine illicit substances) for black youth but were for white youth. Associations between commitment and rebellious behavior and future drug use were substantially higher among white than black youths. Overall, this study provided a preponderance of evidence that highlighted more similarity than differences in the predictive validities between race and gender groups.

Farrell and colleagues (Farrell, 1993; Farrell, Danish, & Howard, 1992a; Farrell, Danish, & Howard, 1992b; Farrell, 1994) examined predictors of substance use and related problem behaviors in a sample of low-income, African American middle school students attending urban public schools. This study represents a unique opportunity to examine predictors of drug use in youth from

neighborhoods with high rates of drug use and crime. Using cross-sectional data, Farrell et al. (1992b) showed that relations between sexual behavior, drug use (cigarettes, drunkenness, marijuana use), and delinquency were adequately accounted for by a single latent construct reflecting problem behavior. This finding was consistent with previous reported evidence based on a sample of white youth (Donovan & Jessor, 1985) as well as a mixed racial sample of middle school students (McGee & Newcomb, 1992). Separately, Farrell et al. (1992a) conducted a cross-validation study with two cohorts comprised of inner-city disadvantaged black youth. These authors examined 26 risk factors covering the gamut from conventional behavior, delinquency, emotional restraint (e.g., impulse control), distress (e.g., depression), self-esteem, to coping strategies. Overall, eight risk factors predicted past 30-day gateway drug use ($R^2 = 37\%$). Most prominent among these were unsupervised time at home, friends' influence (approval and use), delinquency, poor coping strategies, and future intentions to use drugs. Overall, this research supports a multiple pathway model of drug use consistent with problem behavior theory (see also Farrell & White, 1998 and Sullivan & Farrell, 1999 for more detailed examination of the concept of risk and drug use among urban minority youth).

Vaccaro and Wills (1998) examined a stress-coping model of drug use in a racially mixed sample of 7th grade youth who were then followed into the 9th grade. Interestingly, a series of regression models testing ethnic and gender differences indicated that the magnitude of predictor-outcome relations (there were 12 psychosocial measures tapping coping, life events, positive/negative affect, and social support) were more modest for African American students compared with either Hispanic or white youth. Based on three independent analyses, these authors ruled out the possibility that statistical artifacts were responsible for the consistent pattern of differential predictive relations. These analyses included examining three important concerns related to understanding drug use among minority youth including whether: (1) drug use among black youth is bimodal and thus potentially moderates psychosocial functioning; (2) there is differential reliability for the psychosocial measures for the different ethnic groups; and (3) demographic measures (e.g., parental education and family structure) potentially confound our understanding of relations between risk and drug use. All told, the basic pattern of relations between psychosocial functioning and drug use remained unaltered after taking into consideration these important concerns.

Based on an etiologic model linking self-attitudes with drug use, Wills (1994) reported that positive and negative self-esteem and positive and negative perceived control predicted unique variation in substance use in a multi-ethnic, adolescent, school-based sample. However, when all four predictors were combined into a single model, only negative self-esteem and positive control uniquely predicted drug use. Longitudinal analyses with appropriate controls for early levels of substance use indicated that only perceived control predicted drug use in the manner

hypothesized. Analyses to detect ethnic and gender differences showed that self-attitudes were not a significant predictor of drug use among black youth.

Zimmerman et al. (2000) reported that a stress-buffering model did not adequately account for drug use outcomes in a cohort of urban, black, male adolescents. Much of the research examining stress-buffering hypotheses has been conducted with predominantly white, middle-class samples and the noted differences in findings underscores the importance of examining the role of stress and social support in minority youth. For minority youth, especially blacks, adult mentors, community agencies, and extended families may provide quality social support relations that prevent deviancy. Separately, Maton and Zimmerman (1992) reported on a high-risk sample including a high percentage of school dropouts and unemployed black youth. This short-longitudinal study examined three etiological perspectives including a lifestyle approach that suggests poor psychological controls and social deviance promote substance use, a social support/stress approach that focuses on social relations as deterrents to drug use, and an impaired consequences approach that suggests early deficits in psychological functioning (poor self-esteem, depression, anxiety) promote drug use. Longitudinal analyses indicated only school status and life events at follow-up predicted alcohol use, controlling for prior levels of use. A set of analyses predicting only marijuana use indicated that only self-esteem at Time 1 and parent support at Time 2 predicted significantly follow-up marijuana involvement (coefficient values were in the expected directions).

Some studies of ethnic minority youth focus on personality characteristics and could easily be classified along multiple domains of risk. Chen, Anthony, and Crum (1999) examined prospective predictors of alcohol use and alcohol-related problems over a four-year period in a sample of inner-city youth (76% black). Predictors of initial alcohol use and problems included perceived cognitive competence, depressive symptoms, and peer alcohol use. Decreasing levels of competence increased the risk for developing alcohol-related problems and presence of depressive symptoms increased the risk for alcohol-related problems controlling for other important demographic characteristics (age, sex, race, and peer use). Estimates of relative risk based on tests for interactions between competence and depressive symptoms indicated that students reporting low competence and at least one depressive symptom were at 70% excess risk for alcohol-related problems relative to students reporting high competence and no depressive symptoms. Stratified by gender, this relation was significant for girls but not for boys.

Finally, Vega and Gil (1998) present a comprehensive model of drug use based on a large sample of male multi-ethnic youth (63.5% Hispanic, 20% Black, and 13% White, Non-Hispanic). These youth, drawn from public schools in Dade County, Florida, responded to self-report instruments at three annual assessments. Parents and teachers also provided corollary data at Time 1 (6th-7th grade). Although these investigators tested a variety of theoretically driven etiologic models, perhaps the most relevant is the esteem-enhancement model (see also: Vega

et al., 1996). Based largely on the self-derogation model, a basic premise of esteem enhancement is that negative self-attributes that arise from social comparison with valued others induce emotional distress. Motivated to alleviate their distress, youth either choose to conform to more conventional standards and mitigate the behaviors that produce feelings of derogation, or they increase their disposition to deviance, reject conventional standards and bond with deviant peers. The process of bonding with deviant peers represents a form of self-acceptance and leads to an increased exposure to delinquent activities, unconventional behavior, and drug use. As a variation on this psychological mechanism, Vega, Gil, and Wagner (in Vega & Gil, 1998), used a three-wave longitudinal model to test the esteem-enhancement model with a cohort of adolescent Hispanic males. Findings indicated that early feelings of self-rejection increased disposition to deviance over a one-year period and was associated with higher reported levels of drug use among peers, also over a one-year period. Drug use and drug use among peers both influenced uniquely later alcohol and marijuana use (the drug use relation covers a two-year period). Interesting, a measure of acculturative stress (perceived discrimination reflecting ethnic conflict) also predicted significantly self-rejection, drug use, and disposition to deviance.

IMPLICATIONS FOR PREVENTION

The effort to compile a compendium of data resources that examine etiology of adolescent drug use raises several important concerns. First, it is evident that there is a tremendous need for an organized theoretical framework, which can provide a synthesis to the current body of knowledge regarding determinants of drug use. Without such a framework it becomes capricious for researchers to select one interpretation of findings over another. Early attempts to organize the multitude of risk factors into an overarching theoretical expression remain largely untested (i.e., the domain model: Huba & Bentler, 1982 and problem behavior theory: Jessor & Jessor, 1977). More recently, Flay has suggested the Theory of Triadic Influence (TTI) as a useful framework from which to guide prevention efforts (Flay & Petraitis, 1994; Petraitis et al., 1995). There are several unique features to the TTI that can help marshal the current fund of etiologic resources. First, the TTI presents a multidimensional, multi-tiered structure to organize cultural-environmental, social situation-context, and intrapersonal influences. In many regards, the five domains of risk highlighted in the present review dovetail quite nicely with the three "streams of influence" outlined in the TTI. The cultural-environmental stream encompasses multi-level neighborhood contextual influences as well as family processes. Families help in the transmission of cultural mores and inculcate specific health values through positive reinforcement, direct modeling, and vicarious learning experiences. Social situation-context influences broadly contain peer social influences and expectancies (vicarious learning processes enacted with peers and adults are most likely responsible for the development of social reinforcement expectancies). Finally, intrapersonal influences

adequately address social and personal self-management skills and personality factors. Thus, five broad domains of risk can be reduced easily to three streams and then further refined according to their proximal or distal manner of influence.

Unfortunately, efforts proscribing data reduction (i.e., reducing large systems of influence into a smaller set of categories) do not sufficiently address concerns associated with the absence of strong theory and the need to synthesize etiologic findings in a manner that can help guide prevention efforts. What is needed is a more refined understanding of how risk factors operate (i.e., does personality influence peer selection) and how risk mechanisms interrelate (i.e., do neighborhood/contextual factors and family processes guide skill acquisition, which in combination with personality regulate social influences [i.e., peer selection mechanisms]). The shortage of macro-level theories to integrate and guide research efforts may present a drawback to current drug abuse prevention efforts. Several possible avenues exist to address this concern. First, researchers need to hone in and develop a greater inclination to articulate specific mechanisms and provide empirical confirmation. Tests of mediation represent one remedy that can identify generative processes within a longitudinal framework. Specific research and design strategies can be implemented to stagger assessments of mediators and outcomes to avoid reciprocal effects (i.e., the outcome is a potential cause of the mediator). Too often, researchers provide promising findings based on cross-sectional associations in which cause and effect cannot be separated. Once smaller pieces of the puzzle are fit together and a larger developmental picture takes shape, bigger and more complex mechanisms can be tested that involve multiple sets of influence (e.g., neighborhood, family, and skills) and these tests should consider extended time frames that truly reflect age-related processes underlying developmental vulnerability.

Second, the underlying nature of these risk mechanisms should be cast in terms of prevention modalities that are culturally relevant, developmentally sound, and theoretically consonant. With regard to theoretical consonance, experimental evidence is required to ascertain the malleability of specific risk factors. For instance, despite the salience of expectancies as proximal risk factors and their prospective predictive strength, it is hard to locate information regarding prevention strategies that focus on the malleability of expectancies. Knowledge of drug effects, on the other hand, is a major component of many prevention efforts, despite a lack of empirical confirmation that knowledge of drug effects is malleable and even linked to target outcomes (for an exception see Scheier et al., 1997). In other words, those skills/cognitions that can be modified appreciably and have connections to the target behaviors should be the focus of interventions. Again, small pieces of the puzzle need to be fit before we can acquire a more complete view of the larger picture. Too often, researchers combine elements of multiple prevention modalities without providing evidence regarding the heuristic value and efficacy of individual components. There are specific research approaches available to test experimentally the efficacy of different prevention modalities, even when they are embedded within a multicomponent approach (West & Aiken,

1997). The effect of inert program features or bundling too many strategies with limited efficacy can be costly. For instance, in the context of impoverished environments, it may be sufficient to equip ethnic minority youth with appropriate self-management skills as an effective deterrent against contextual pressures to engage in antisocial behaviors.

A third issue that clearly surfaces from the present effort to examine etiologic data resources is that there are numerous risk factors overlooked by current prevention efforts. One glaring example is sensation seeking (i.e., impulsivity), an indicator of personality that factors heavily into many etiologic models. Teichman and colleagues pointed to this oversight when they suggested that in order for prevention programs to be successful, they need to be broad and comprehensive and relate to the many dimensions of risk that have been identified as prospective predictors of drug use. Because Teichman and colleagues found sensation seeking to be such a prominent predictor of drug use and found much weaker evidence for anxiety and depression, they suggest programs be less inclined toward self-insight and more inclined toward focusing on motivations for stimulation (i.e., risky behavior).

In a related vein, the work of Kaplan and colleagues represents an important and formidable attempt to gather evidence supporting the role of psychological constructs that tap risk mechanisms essential for the development of self-identity. Unfortunately, programs to enhance self-esteem have fallen into disfavor following the lead of empirical findings providing weak support for the involvement of self-esteem in early-stage drug use. More importantly, the work of Kaplan and colleagues as well as other investigators highlight the importance of affective processes in self-regulation and drug use (e.g., Brunswick, 1988; Labouvie et al., 1990; Scheier et al., 2000). Together, these studies provide a much stronger case for prevention efforts to consider the self as multi-faceted and specifically emphasize affect and personality as key determinants of early-stage drug use. Future developments in prevention may want, then, to revisit the role of affective education in promoting ego resilience as a deterrent to health-compromising behaviors. Early indications of the efficacy of affective education (or lack thereof) were perhaps tainted with program (i.e., strategies embodying the intervention) or implementation (i.e., fidelity of teachers or health educators to instructional methods) failure and not merely theory failure (e.g., Moskowitz, Schaps, Schaeffer, & Malvin, 1984; Schaps, Moskowitz, Malvin, & Schaeffer, 1986). Perhaps the integration of cognitive-skills programs with strategies that focus on esteem enhancement and affective education can offer a more comprehensive antidote to the problem of adolescent drug abuse.

Fourth, conducting a more in-depth examination of those factors underlying vulnerability also encourages a sharper focus on the nature of peer influences. The cumulative findings drawn from studies of peer social influences suggests that a more refined examination of the precise mechanisms involving peers will

perhaps stimulate the efficacy of prevention efforts. The past decade alone has seen a resurgence of interest in peer social influence mechanisms, and researchers are coping with ways to refine their understanding of peer selection and peer socialization as developmental constructs (e.g., Curran et al., 1997; Wills & Cleary, 1999). Additional refinements include distinguishing successfully between peer social conformity and social projection, while an added impetus includes differentiating between active and passive social influences. Two important issues are raised from these and related findings. First, it may be essential to consider the multidimensional nature of peer social influences (e.g., Clasen & Brown, 1985). It is no longer sufficient to assign the activity of peers to a broad catchall of social influences (i.e., "how many of your friends smoke cigarettes") and typify the mechanism of risk under the general rubric of social learning theory (i.e., modeling induces motivation to use drugs). To illustrate this point, Bailey and Hubbard (1991) distinguished successfully between the influence of friends, school peers, and neighborhood peers and reported that perceived close friends' marijuana use was a more potent predictor of transitions to marijuana use.

The research conducted by Ennett and colleagues has helped to clarify how close networks or small clusters of peers contribute differentially to delinquency and drug use. This distinction is of paramount importance when we recognize the importance of clustering effects in group-randomized prevention trials (Murray, 1998; Siddiqui, Hedeker, Flay, & Hu, 1996). Researchers attribute the strength of social influences to tight-knit groups of friends (i.e., intact social groups) and suggest that membership in specific cliques factors heavily into whether a youth becomes delinquent. What goes unnoticed in the dynamics of group processes underlying membership in peer networks are subtle social-psychological mechanisms involving social comparison and self-efficacy evaluations. The integration of these and other important risk mechanisms (i.e., personality: Stacy, Sussman, Dent et al., 1992) with larger contextual or macro-environmental risk factors should become the focus of future etiology studies. Perhaps, in our efforts to construct a grand theory we can synthesize pieces of self-derogation theory with social network analysis and link these formative developmental mechanisms to information gleaned from studies examining the efficacy of skills training and refusal skills tactics. Only when all of these different facets of risk are appreciated together can we hope to make headway into the complex network of influences that stimulate drug use.

As we take a step back from the minute details regarding etiology and cast a wider net over the implications, another concern surfaces. Up until recently, a majority of etiology studies were conducted with predominantly white, middle-class youth. It is essential to point out that there is nothing wrong with conducting etiology studies on relatively homogenous subsets of youth. In fact, the fund of knowledge gathered to date that is based on studies of white middle-class suburban youth does not hinder our collective understanding of etiology. Rather studies based on racially homogenous groups help to clarify the activity of specific

risk mechanisms in the population and are not tainted by questions regarding the specific influence of cultural factors. What we can glean from these studies is a penetrating and decisive look at how etiology unfolds developmentally in one particular segment of the population. On the other hand, it also is important to obtain a more refined understanding of how risk and protection operate in the larger population that includes adequate minority representation. In many respects, there is a noted paucity of studies focusing on establishing the predictive validity of etiology models with ethnic minority youth. To address concerns regarding external validity and to examine whether developmental risk mechanisms operate in a consistent manner across different racial subgroups, a number of studies were included that examined ethnic-specific risk mechanisms and which focused on establishing prevalence rates for drug use and risk factors in minority samples.

Once evidence on minority youth was compiled, a consensus formed suggesting that risk mechanisms reported to operate with white middle-class youth produce similar outcomes among minority youth. This should not be surprising according to Rowe et al. (1996), who point out the need to distinguish between differences in mean levels of risk (or drug use) and the activity (i.e., generative processes) of risk mechanisms that promote drug use. The fact that white youth, for instance, report higher relative levels on a particular risk factor does not preclude this risk factor from operating in a similar fashion among minority youth. It is essential, therefore, that researchers test models that involve causal mechanisms using appropriate longitudinal methodologies and examine the validity of these models with diverse racial samples. Nonetheless, the cumulative effect given the consistency of findings across different ethnic groups is that various prevention modalities targeted to ethnic minority youth should continue to be successful as long as they are guided by empirical findings that rest on sound theory (e.g., G. Botvin, Dusenbury, Baker, James-Ortiz, E. Botvin, & Kerner, 1992; Botvin, Schinke, Epstein, Diaz, & Botvin, 1995).

There are a number of compelling forces that may operate to influence ethnic minority youth. For instance, a greater percent of minority youth report feeling unsafe at school and greater percentages of Black youth report being suspended or expelled from school (National Institute on Drug Abuse, 1995). National educational statistics show that school dropout rates are highest among minority youth (US Department of Education, 1996). It is important to consider that students that dropout from school often turn to the streets to complete their education. Life on the streets and outside of school carries additional grave risks. For instance, Hispanic youth report being more frequently approached in the past month by someone selling drugs (White 14.4%, Black 12.3%, and Hispanic 16.2%) and black youth report observing more people drunk in their neighborhood (White 36.5%, Black 58.4%, and Hispanic 46.7%: National Institute on Drug Abuse, 1995).

A separate body of research shows that black youth in particular develop resilience in the form of self-efficacy that offsets the pressing nature of adverse

influences (e.g., Spencer, Cole, DuPree, Glymph, & Pierre, 1993). Along these lines, keeping minority youth in school enhances their opportunities to acquire and develop the requisite skills (i.e., personal competence, academic self-esteem, self-management skills) that can protectively offset motivations to use drugs. Again, efforts to synthesize the multiple domains of risk into a single comprehensive theory may provide the necessary tools to shape prevention efforts to be effective with minority populations. These efforts should consider the influence of neighborhoods, the role of family, culture mores that sanction specific behaviors (i.e., machismo among Hispanic-males), and ethnic-specific risk mechanisms (i.e., ethnic identity) that may contribute to health behaviors (e.g., Martinez & Dukes, 1997). Only when the complete network of influences is understood will our efforts to provide a basis for healthy lifestyles be achievable in diverse settings.

REFERENCES

- Aloise-Young, P. A., Graham, J. W., & Hansen, W. B. (1994). Peer influence on smoking initiation during early adolescence: A comparison of group members and group outsiders. *Journal of Applied Psychology, 79*, 281–287.
- Ary, D. V., Tildesley, E., Hops, H., & Andres, J. (1993). The influence of parent, sibling, and peer modeling and attitudes on adolescent use of alcohol. *The International Journal of the Addictions, 28*, 853–880.
- Bailey, S. L., & Hubbard, R. L. (1991). Developmental changes in peer factors and the influence on marijuana initiation among secondary school students. *Journal of Youth and Adolescence, 20*, 339–360.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ; Prentice-Hall.
- Bandura, A. (1978). Reflections on self-efficacy. *Advances in Behavioral Research and Therapy, 1*, 237–269.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191–215.
- Barnea, Z., Teichman, M., & Rahav, G. (1992). Personality, cognitive, and interpersonal factors in adolescent substance use: A longitudinal test of an integrative model. *Journal of Youth and Adolescence, 21*, 187–201.
- Barnes, G. M. (1990). Impact of the family on adolescent drinking patterns. In R. L. Collins, K. E. Leonard, & J. S. Searles (Eds.), *Alcohol and the family: Research and clinical perspectives* (pp. 137–161). New York: Guilford Press.
- Barnes, G. M., & Farrell, M. P. (1992). Parental support and control as predictors of adolescent drinking, delinquency, and related problem behaviors. *Journal of Marriage and the Family, 54*, 763–776.
- Barnes, G. M., Farrell, M. P., & Banerjee, S. (1994). Family influences on alcohol abuse and other problem behaviors among black and white adolescents in a general population sample. *Journal of Research on Adolescence, 4*, 183–201.
- Barnes, G. M., Reifman, A. S., Farrell, M. P., & Dintcheff, B. A. (2000). The effects of parenting on the development of adolescent alcohol misuse: A six-wave latent growth model. *Journal of Marriage and the Family, 62*, 175–186.
- Bates, M., E., & Pandina, R. J. (1989). Individual differences in the stability of personality needs: Relations to stress and substance use during adolescence. *Personality and Individual Differences, 109*, 1151–1157.
- Bauman, K. E., & Fisher, L. A. (1986). On the measurement of friend behavior in research on friend influence and selection: Findings from longitudinal studies of adolescent smoking and drinking. *Journal of Youth and Adolescence, 15*, 345–353.

- Bauman, K. E., Fisher, L. A., Bryan, E. S., & Chenoweth, R. L. (1984). Antecedents, subjective expected utility, and behavior: A study of adolescent cigarette smoking. *Addictive Behaviors, 9*, 121–136.
- Biddle, B. J., Bank, B. J., & Marlin, M. M. (1980a). Parental and peer influence on adolescents. *Social Forces, 58*, 1057–1079.
- Biddle, B. J., Bank, B. J., & Marlin, M. M. (1980b). Social determinants of adolescent drinking: What they think, what they do and what I think and do. *Journal of Studies on Alcohol, 41*, 215–240.
- Botvin, G. J. (1997). Substance abuse prevention through life skills training. In R. Peters and R. J. McMahon (Eds.), *Preventing child hood disorders, substance abuse, and delinquency* (pp. 215–239). Bariff International Behavioral Science Series. Thousand Oaks, CA: Sage.
- Botvin, G. J. (1995). Principles of prevention. In R. H. Coombs & D. M. Ziedonis (Eds.), *Handbook on drug abuse prevention: A comprehensive strategy to prevent the abuse of alcohol and other drugs* (pp. 19–44). Boston, MA: Allyn & Bacon.
- Botvin, G. J., Baker, E., Dusenbury, L., Botvin, E., & Diaz, T. (1995). Long-term follow-up of a randomized drug abuse prevention trial in a white middle-class population. *Journal of the American Medical Association, 273*, 1106–1112.
- Botvin, G. J., Dusenbury, L., Baker, E., James-Ortiz, S., & Botvin, E. M., & Kerner, J. (1992). Smoking prevention among urban minority youth: Assessing effects on outcome and mediating variables. *Health Psychology, 11*, 290–299.
- Botvin, G. J., Schinke, S. P., Epstein, J. A., Diaz, T., & Botvin, E. M. (1995). Effectiveness of culturally focused and generic skills training approaches to alcohol and drug abuse prevention among minority adolescents: Two-year follow-up results. *Psychology of Addictive Behaviors, 9*, 183–194.
- Brook, J. S., & Brook, J. E. (1988). A developmental approach examining social and personal correlates in relation to alcohol use over time. *The Journal of Genetic Psychology, 149*, 93–110.
- Brook, J. S., Gordon, A. S., & Whiteman, M. (1985). Stability of personality during adolescence and its relationship to stage of drug use. *Genetic, Social, and General Psychology Monographs, 111*, 319–330.
- Brook, J. S., Whiteman, M., Finch, S. J., Morojele, N. K., & Cohen, P. (2000). Individual latent growth curves in the development of marijuana use from childhood to young adulthood. *Journal of Behavioral Medicine, 23*, 451–464.
- Brook, J. S., Whiteman, M., & Gordon, A. S. (1982). Qualitative and quantitative aspects of adolescent drug use: Interplay of personality, family, and peer correlates. *Psychological Reports, 51*, 1151–1163.
- Brook, J. S., Whiteman, M., Gordon, A. S., & Cohen, P. (1986). Dynamics of childhood and adolescent personality traits and adolescent drug use. *Developmental Psychology, 22*, 403–414.
- Brook, J. S., Whiteman, M., Nomura, C., Gordon, A. S., & Cohen, P. (1988). Personality, family, and ecological influences on adolescent drug use: A developmental analysis. In R. H. Coombs (Ed.), *The family context of adolescent drug use* (pp. 123–161). Binghamton, NY: Haworth Press.
- Brooks-Gunn, J., Duncan, G. J., Klebanov, K., & Sealand, N. (1993). Do neighborhoods influence child and adolescent development? *American Journal of Sociology, 99*, 353–394.
- Brunswick, A. F. (1988). Drug use and affective distress: A longitudinal study of urban black youth. *Advances in Adolescent Mental Health, 3*, 101–125.
- Catalano, R. F., Kosterman, R., Hawkins, J. D., Newcomb, M. D., & Abbott, R. D. (1996). Modeling the etiology of adolescent substance use: A test of the social development model. *Journal of Drug Issues, 26*, 429–455.
- Chassin, L., Barrera, M., Bech, K., & Kossak-Fuller, J. (1992). Recruiting a community sample of adolescent children of alcoholics: A comparison of three subject sources. *Journal of Studies on Alcohol, 53*, 316–320.
- Chassin, L., Curran, P. J., Hussong, A. M., & Colder, C. R. (1996). The relation of parent alcoholism to adolescent substance use: A longitudinal follow-up study. *Journal of Abnormal Psychology, 105*, 70–80.
- Chassin, L., Rogosch, R., & Barrera, M. (1991). Substance use and Symptomatology among adolescent children of alcoholics. *Journal of Abnormal Psychology, 100*, 449–463.
- Chen, L.-S., Anthony, J. C., & Crum, R. M. (1999). Perceived cognitive competence, depressive symptoms and the incidence of alcohol-related problems in urban school children. *Journal of Child and Adolescent Substance Abuse, 8*, 37–53.

- Chen, M.-S., Grube, S. W., & Madden, P. A. (1994). Alcohol expectancies and adolescent drinking: Differential prediction of frequency, quantity, and intoxication. *Addictive Behaviors, 19*, 521–529.
- Clasen, D. R., & Brown, B. B. (1985). The multidimensionality of peer pressure in adolescence. *Journal of Youth and Adolescence, 14*, 451–468.
- Colder, C. R., Chassin, L., Stice, E. M., & Curran, P. J. (1997). Alcohol expectancies as potential mediators of parent alcoholism effects on the development of adolescent heavy drinking. *Journal of Research on Adolescence, 7*, 349–374.
- Curran, P. J., Stice, E., & Chassin, L. (1997). The relation between adolescent alcohol use and peer alcohol use: A longitudinal random coefficients model. *Journal of Consulting and Clinical Psychology, 65*, 130–140.
- Darling, N., & Steinberg, L. (1993). Parenting style as context: An integrative model. *Psychological Bulletin, 113*, 487–496.
- Department of Health and Human Services (1990). *Healthy People 2000: National Health Promotion and Disease Prevention Objectives: Full Report* (DHHS Pub. No. PHS 91-50212). Washington, DC: Superintendent of Documents.
- Dermen, K. H., Cooper, M. L., & Agocha, V. B. (1998). Sex-related alcohol expectancies as moderators of the relationship between alcohol use and risky sex in adolescents. *Journal of Studies on Alcohol, 59*, 71–77.
- Dishion, T. J., & Loeber, R. (1985). Adolescent marijuana and alcohol use: The role of parents and peers revisited. *American Journal of Drug and Alcohol Abuse, 11*, 11–25.
- Donohue, B., Van Hasselt, V. B., Hersen, M., & Perrin, S. (1999). Substance refusal skills in a population of adolescents diagnosed with conduct disorder and substance abuse. *Addictive Behaviors, 24*, 37–46.
- Donovan, J. E., & Jessor, R. (1985). Structure of problem behavior in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology, 53*, 890–904.
- Duncan, S. C., Alpert, A., Duncan, T. E., & Hops, H. (1997). Adolescent alcohol use development and young adult outcomes. *Drug and Alcohol Dependence, 49*, 39–48.
- Duncan, T. E., Tildesley, E., Duncan, S. C., & Hops, H. (1995). The consistency of family and peer influences on the development of substance use in adolescence. *Addiction, 90*, 1647–1660.
- Durant, R. H., Cadenhead, C., Pendergrast, R. A., Slavens, G., & Linder, C. W. (1994). Factors associated with the use of violence among urban Black adolescents. *American Journal of Public Health, 84*, 612–617.
- Dusenbury, L., & Botvin, G. J. (1992). Substance abuse prevention: Competence enhancement and the development of positive life options. *Journal of Addictive Diseases, 11*, 29–44.
- Ellickson, P. L., Bell, R. M., & Harrison, E. R. (1993). Changing adolescent propensities to use drugs: Results from Project ALERT. *Health Education Quarterly, 20*, 227–242.
- Ennett, S. T., & Bauman, K. E. (1996). Adolescent social networks: School, demographic, and longitudinal considerations. *Journal of Adolescent Research, 11*, 194–215.
- Ennett, S. T., & Bauman, K. E. (1994). The contribution of influence and selection to adolescent peer group homogeneity: The case of adolescent cigarette smoking. *Journal of Personality and Social Psychology, 67*, 653–663.
- Ennett, S. T., & Bauman, K. E. (1993). Peer group structure and adolescent cigarette smoking: A social network analysis. *Journal of Health and Social Behavior, 34*, 226–236.
- Ennett, S. T., Bauman, K. E., & Koch, G. G. (1994). Variability in cigarette smoking within and between adolescent friendship cliques. *Addictive Behaviors, 19*, 295–305.
- Ennett, S. T., Flewelling, R. L., Lindrooth, R. C., & Norton, E. C. (1997). School and neighborhood characteristics associated with school rates of alcohol, cigarette, and marijuana use. *Journal of Health and Social Behavior, 38*, 55–71.
- Farrell, A. D. (1993). Risk factors for drug use in urban adolescents: A three-wave longitudinal study. *The Journal of Drug Issues, 23*, 443–462.
- Farrell, A. D. (1994). Structural equation modeling with longitudinal data: strategies for examining group differences and reciprocal relationships. *Journal of Consulting and Clinical Psychology, 62*, 477–487.
- Farrell, A. D., Danish, S. J., & Howard, C. W. (1992a). Risk factors for drug use in urban adolescents: Identification and cross-validation. *American Journal of Community Psychology, 20*, 263–286.

- Farrell, A. D., Danish, S. J., & Howard, C. W. (1992b). Relationship between drug use and other problem behaviors in urban adolescents. *Journal of Consulting and Clinical Psychology, 60*, 705–712.
- Farrell, A. D., & White, K. S. (1998). Peer influences and drug use among urban adolescents: Family structure and parent—adolescent relationship as protective factors. *Journal of Consulting and Clinical Psychology, 66*, 248–258.
- Farrell, M. P., Barnes, G. M., & Banerjee, S. (1995). Family cohesion as a buffer against the effects of problem-drinking fathers on psychological distress, deviant behavior, and heavy drinking in adolescents. *Journal of Health and Social Behavior, 36*, 377–385.
- Flay, B. R., & Petraitis, J. (1994). The theory of triadic influence: A new theory of health behaviour with implications for preventive interactions. *Advances in Medical Sociology, Vol. 4* (pp. 19–44). Greenwich, CT: JAI press, Inc.
- Fromme, K., D'Amico, E. J., & Katz, E. C. (1999). Intoxicated sexual risk taking: An expectancy or cognitive impairment explanation? *Journal of Studies on Alcohol, 60*, 54–63.
- Fromme, K., Katz, E., & D'Amico, E. J. (1997). Effects of alcohol intoxication on the perceived consequences of risk taking. *Experimental and Clinical Psychopharmacology, 5*, 14–23.
- Glynn, T. J. (1984). Adolescent drug use and the family environment: A review. *Journal of Drug Issues, 2* (Spring), 271–295.
- Gottfredson, D. C., McNeil, R. J., & Gottfredson, G. D. (1991). Social area influences on delinquency: A multilevel analysis. *Journal of Research on Crime and Delinquency, 28*, 197–226.
- Gottfredson, D. C., & Koper, C. S. (1996). Race and sex differences in the prediction of drug use. *Journal of Consulting and Clinical Psychology, 64*, 305–313.
- Graham, J. W., Marks, G. S., & Hansen, W. B. (1991). Social influence processes affecting adolescent substance use. *Journal of Applied Psychology, 76*, 291–298.
- Grube, J. W. & Agostinelli, G. E. (1999). Perceived consequences and adolescent drinking: Nonlinear and interactive models of alcohol expectancies. *Psychology of Addictive Behaviors, 13*, 303–312.
- Grube, J. W., Chen, M.-J., Madden, P., & Morgan, M. (1995). Predicting adolescent drinking from alcohol expectancy values: A comparison of additive, interactive, and nonlinear models. *Journal of Applied Social Psychology, 25*, 839–857.
- Hansen, W. B., & Graham, J. W. (1991). Preventing alcohol, marijuana, and cigarette use among adolescents: Peer pressure resistance training versus establishing conservative norms. *Preventive Medicine, 20*, 414–430.
- Hansen, W. B., Graham, J. W., Sobel, J. L., Shelton, D. R., Flay, B. R., & Johnson, C. A. (1987). The consistency of peer and parent influences on tobacco, alcohol, and marijuana use among young adolescents. *Journal of Behavioral Medicine, 10*, 559–579.
- Hawkins, J. Catalano, R., Gillmore, M. R., & Wells, E. A. (1989). Skills training for drug abusers: Generalization, maintenance, and effects on drug use. *Journal of Clinical and Consulting Psychology, 57*, 559–563.
- Hawkins, J. Catalano, R., & Miller, J. (1992). Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin, 112*, 64–105.
- Hawkins, J. D., & Weis, J. G. (1985). The social development model: An integrated approach to delinquency prevention. *Journal of Primary Prevention, 6*, 73–97.
- Huba, G. J., & Bentler, P. M. (1982). A developmental theory of drug use: Derivation and assessment of a causal modeling approach. In P. B. Baltes & O. G. Brim, Jr (Eds.), *Life span development and behavior* (Vol. 4; pp. 147–203). New York: Academic Press.
- Huba, G. J., Wingard, J. A., & Bentler, P. M. (1979). Beginning adolescent drug use and peer and adult interaction patterns. *Journal of Consulting and Clinical Psychology, 47*, 265–276.
- Huba, G. J., Wingard, J. A., & Bentler, P. M. (1980). Longitudinal analysis of the role of peer support, adult models, and peer subcultures in beginning adolescent substance use: An application of setwise canonical correlation methods. *Multivariate Behavioral Research, 15*, 259–280.
- Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.
- Jessor, R., Van Den Bos, J., Vanderryn, J., Costa, F. M., & Turbin, M. S. (1995). Protective factors in adolescent problem behavior: Moderator effects and developmental change. *Developmental Psychology, 31*, 923–933.
- Jessor, R., Donovan, J. E. & Costa, F. M., (1991). *Beyond adolescence: Problem behavior and young adult development*. New York: Cambridge University Press.

- Jessor, R., Turbin, M. S., & Costa, F. M., (1998). Protective factors in adolescent health behavior. *Journal of Personality and Social Psychology*, 75, 788–800.
- Johnson, V., & Pandina, R. J. (1991). Effects of the family environment on adolescent substance use, delinquency, and coping styles. *American Journal of Drug and Alcohol Abuse*, 17, 71–88.
- Kandel, D. B. (1986). Processes of peer influences in adolescence. In R. K. Silbereisen, K. Eyferth, & G. Rudinger (Eds.), *Development as action in context: Problem behavior and normal youth development* (pp. 203–228) New York: Springer-Verlag.
- Kandel, D. B., & Andrews, K. (1987). Processes of adolescent socialization by parents and peers. *International Journal of the Addictions*, 22, 319–342.
- Kaplan, H. B., & Lin, C-H. (2000). Deviant identity as a moderator of the relation between negative self-feelings and deviant behavior. *Journal of Early Adolescence*, 20, 150–177.
- Kaplan, H. B. (1980). *Deviant behavior in defense of self*. New York: Academic Press.
- Kaplan, H. B., Johnson, R. J., & Bailey, C. A. (1988). Explaining adolescent drug use: An elaboration strategy for structural equation modeling. *Psychiatry*, 51, 142–163.
- Kaplan, H. B., Martin, S. S., & Robbins, C. (1984). Pathways to adolescent drug use: Self-derogation, peer influence, weakening of social controls, and early substance use. *Journal of Health and Social Behavior*, 25, 270–289.
- Kaplan, H. B., Martin, S. S., & Robbins, C. (1982). Application of a general theory of deviant behavior: Self-derogation and adolescent drug use. *Journal of Health and Social Behavior*, 23, 274–294.
- Kim, S., McLeod, J. H., Williams, C., & Hepler, N. (2000). Prevention validation and accounting platform: A framework for establishing accountability and performance measures of substance abuse prevention programs. *Journal of Drug Education*, 30, 1–143.
- Krosnick, J. A., & Judd, C. M. (1982). Transitions in social influence at adolescence: Who induces cigarette smoking? *Developmental Psychology*, 18, 359–368.
- Labouvie, E. W. (1990). Personality and alcohol and marijuana use: Patterns of convergence in young adulthood. *The International Journal of the Addictions*, 25, 247–252.
- Labouvie, E. W. (1986). The coping function of adolescent alcohol and drug use. In R. K. Silbereisen, K. Eyferth, & G. Rudinger (Eds.) *Development is action in context*, (pp. 229–240). New York: Springer-Verlag.
- Labouvie, E. W. (1987). Relation of personality to adolescent alcohol and drug use: A coping perspective. *Pediatrician*, 14, 19–24.
- Labouvie, E. W., & McGee, C. R. (1986). Relation of personality to alcohol and drug use in adolescence. *Journal of Consulting and Clinical Psychology*, 54, 289–293.
- Labouvie, E. W., Pandina, R. J., & Johnson, V. (1991). Developmental trajectories of substance use in adolescence: Differences and predictors. *International Journal of Behavioral Development*, 14, 305–328.
- Labouvie, E. W., Pandina, R. J., White, H. R., & Johnson, V. (1990). Risk factors of adolescence drug use: An affect-based interpretation. *Journal of Substance Abuse*, 2, 265–285.
- Leigh, B. C., & Stacy, A. W. (1993). Alcohol outcomes expectancies: Scale construction and Predictive utility in higher order confirmatory models. *Psychological Assessment*, 5, 216–229.
- Leigh, B. C., & Stacy, A. W. (1991). On the scope of alcohol expectancy research: Remaining issues of measurement and meaning. *Psychological Bulletin*, 110, 147–154.
- Marks, G., Graham, J. W., & Hansen, W. B. (1992). Social projection and social conformity in adolescent alcohol use: A longitudinal analysis. *Personality and Social Psychology Bulletin*, 18, 96–101.
- Martinez, R. O., & Dukes, R. L. (1997). The effects of ethnic identity, ethnicity, and gender on adolescent well-being. *Journal of Youth and Adolescence*, 26, 503–516.
- Maton, K. I., & Zimmerman, M. A. (1992). Psychosocial predictors of substance use among urban black male adolescents. *Drugs and Society*, 6, 79–113.
- McGee, L., & Newcomb, M. D. (1992). General deviance syndrome: Expanded hierarchical evaluations at four ages from early adolescence to adulthood. *Journal of Consulting and Clinical Psychology*, 60, 766–776.
- Moskowitz, J. M., Schaps, E., Schaeffer, G. A., & Malvin, J. H. (1984). Evaluation of a substance abuse prevention program for junior high school students. *The International Journal of the Addictions*, 19, 419–430.
- Murray D. M. (1998). *Design and analysis of group-randomized trials*. New York, Oxford University Press.

- National Institute on Drug Abuse, 1995. *Drug use among racial/ethnic minorities*. Department of Health and Human Services Publication No. 95-3888. Rockville, MD: Author.
- Needle, R. H., Su, S., & Doherty, W. J. (1990). Divorce, remarriage, and adolescent substance use: A prospective longitudinal study. *Journal of Marriage and the Family*, *52*, 157–169.
- Newcomb, M. D., & Bentler, P. M. (1988a). *Consequences of teenage drug use: Impact on the lives of young adults*. Beverly Hills, CA: Sage Publications.
- Newcomb, M. D., & Bentler, P. M. (1988b). Impact of adolescent drug use and social support on problems of young adults: A longitudinal study. *Journal of Abnormal Psychology*, *97*, 64–75.
- Newcomb, M. D., Chou, C-P, Bentler, P. M., & Huba, G. J. (1988). Cognitive motivations for drug use among adolescents: Longitudinal tests of gender differences and predictors of change in drug use. *Journal of Counseling Psychology*, *35*, 426–438.
- Oetting E. R., & Beauvais, F., (1987). Peer cluster theory, socialization characteristics, and adolescent drug use: A path analysis. *Journal of Counseling Psychology*, *34*, 205–213.
- Office of National Drug Control Policy (1997). *The National Drug Control Strategy, 1997*. Washington, DC: Executive Office of the President. Document NCJ163915.
- Pandina, R. J., & Johnson, V. (1989). Familial drinking history as a predictor of alcohol and drug consumption among adolescent children. *Journal of Studies on Alcohol*, *50*, 245–253.
- Pandina, R. J., & Johnson, V. (1990). Serious alcohol and drug problems among adolescents with a family history of alcoholism. *Journal of Studies on Alcohol*, *51*, 278–282.
- Paschall, M. J., & Hubbard, M. L. (1998). Effects of neighborhood and family stressors on African American male adolescents' self-worth and propensity for violent behavior. *Journal of Consulting and Clinical Psychology*, *66*, 825–831.
- Patterson, G. R., & Stouthamer-Loeber, M. (1984). The correlation of family management practices and delinquency. *Child Development*, *55*, 1299–1307.
- Pentz, M. A., Dwyer, J. H., MacKinnon, D. P., Flay, B. R., Hansen, W. B., Wang, E. Y., & Johnson, C. A. (1989). A multicommunity trial for primary prevention of adolescent drug abuse: Effects on drug use prevalence. *Journal of the American Medical Association*, *261*, 3259–3267.
- Pentz, M. A. (1985). Social competence and self-efficacy as determinants of substance use in adolescence. In T. A. Wills & S. Shiffman (Eds.), *Coping and substance use* (pp. 117–142). San Diego, CA: Academic Press.
- Petraitis, J., Flay, B. R., & Miller, T. Q. (1995). Reviewing theories of adolescent substance abuse: Organizing pieces of the puzzle. *Psychological Bulletin*, *117*, 67–86.
- Rowe, D. C., Vazsonyi, A. T., & Flannery, D. J. (1994). No more than skin deep: ethnic and racial similarity in developmental processes. *Psychological Review*, *101*, 396–413.
- Schaps, E., Moskowitz, J. M., Malvin, J. H., & Schaeffer, G. A. (1986). Evaluation of seven school-based prevention programs: A final report on the Napa Project. *The International Journal of the Addictions*, *21*, 1081–1112.
- Scheier, L. M., & Botvin, G. J. (1998). Relations of social skills, personal competence, and adolescent alcohol use: A developmental exploratory study. *Journal of Early Adolescence*, *18*, 77–114.
- Scheier, L. M., & Botvin, G. J. (1997). Expectancies as mediators of the effects of social influences and alcohol knowledge on adolescent alcohol use: A prospective analysis. *Psychology of Addictive Behaviors*, *11*, 48–64.
- Scheier, L. M., & Botvin, G. J. (1995). Effects of early adolescent drug use on cognitive efficacy in early-late adolescence: A developmental structural model. *Journal of Substance Abuse*, *7*, 379–404.
- Scheier, L. M., Botvin, G. J., & Baker, E. (1997). Risk and protective factors as predictors of adolescent alcohol involvement and transitions in alcohol use: A prospective analysis. *Journal of Studies on Alcohol*, *58*, 652–667.
- Scheier, L. M., Botvin, G. J., Griffin, K. W., & Diaz, T. (2000). Dynamic growth models of self-esteem and adolescent alcohol use. *Journal of Early Adolescence*, *20*, 178–209.
- Scheier, L. M., Botvin, G. J., Griffin, K. W., & Diaz, T. (1999). Latent growth models of drug refusal skills and adolescent alcohol use. *Journal of Alcohol and Drug Education*, *44*, 21–48.
- Scheier, L. M., Botvin, G. J., Diaz, T., & Griffin, K. W. (1999). Social skills, competence, and drug refusal efficacy as predictors of adolescent alcohol use. *Journal of Drug Education*, *29*, 251–278.
- Schinke, S. P., Gilchrist, L. D., & Snow, W. H. (1985). Skills intervention to prevent cigarette smoking among adolescents. *American Journal of Public Health*, *75*, 665–667.

- Schulenberg, J., Wadsworth, J. N., O'Malley, P. M., Bachman, J. G., & Johnston, L. D. (1996). Adolescent risk factors for binge drinking during the transition to young adulthood: Variable- and pattern-centered approaches to change. *Developmental Psychology, 32*, 659–674.
- Shope, J. T., Copeland, L. A., Kamp, M. E., & Lang, S. W. (1998). Twelfth grade follow-up of the effectiveness of a middle school-based substance abuse prevention program. *Journal of Drug Education, 28*, 185–197.
- Shope, J. T., Copeland, L. A., Marcoux, B. C., & Kamp, M. E. (1996). Effectiveness of a school-based substance abuse prevention program. *Journal of Drug Education, 26*, 323–337.
- Shope, J. T., Copeland, L. A., Maharg, R., Dielman, T. E., & Butchart, A. T. (1993). Assessment of adolescent refusal skills in an alcohol misuse prevention study. *Health Education Quarterly, 20*, 373–390.
- Shope, J. T., Dielman, T. E., Butchart, A. T., Campanelli, P. C., & Kloska, D. D. (1992). An elementary school-based alcohol misuse prevention program: A follow-up evaluation. *Journal of Studies on Alcohol, 53*, 106–121.
- Siddiqui, O., Hedeker, D., Flay, B. R., & Hu, F. B. (1996). Intraclass correlation estimation in a school-based smoking prevention study: Outcome and mediating variables, by sex and ethnicity. *American Journal of Epidemiology, 144*, 425–433.
- Smith, G. M. (1986). Adolescent personality traits that predict young adult drug use. *Comprehensive Therapy, 12*, 44–50.
- Smith, G. M., & Fogg, C. P. (1979). Psychological antecedents of teen-age drug use. *Research in Community and Mental Health, 1*, 87–102.
- Smith, G. M., & Fogg, C. P. (1978). Psychological predictors of early use, late use, and nonuse of marihuana among teenage students. In D. B. Kandel (Ed.), *Longitudinal research on drug use: Empirical findings and methodological issues* (pp. 101–113). Washington, DC: Hemisphere.
- Smith, G. T., & Goldman, M. S. (1995). Alcohol expectancy theory and the identification of high-risk adolescents. In G. M. Boyd, J. Howard, & R. A. Zucker (Eds.), *Alcohol problems among adolescents: Current directions in prevention research* (pp. 85–104). Hillsdale, NJ: Lawrence Erlbaum Publishers.
- Smith, G. T., Goldman, M. S., Greenbaum, P. E., & Christiansen, B. A. (1995). Expectancy for social facilitation from drinking: The divergent paths of high-expectancy and low-expectancy adolescents. *Journal of Abnormal Psychology, 104*, 32–40.
- Spencer, M. B., Cole, S. P., DuPree, D., Glymph, A., & Pierre, P. (1993). Self-efficacy among urban African American early adolescents: Exploring issues of risk, vulnerability, and resilience. *Development and Psychopathology, 5*, 719–739.
- Stacy, A. W. (1997). Memory activation and expectancy as prospective predictors of alcohol and marijuana use. *Journal of Abnormal Psychology, 106*, 61–73.
- Stacy, A. W., Galaf, E. R., Sussman, S., & Dent, C. W. (1996). Self-generated drug outcomes in high-risk adolescents. *Psychology of Addictive Behaviors, 10*, 18–27.
- Stacy, A. W., Leigh, B. C., & Weingardt, K. R. (1994). Memory accessibility and association of alcohol use and its positive outcomes. *Experimental and Clinical Psychopharmacology, 2*, 269–282.
- Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (1991a). Cognitive motivations and drug use: A 9-year longitudinal study. *Journal of Abnormal Behavior, 100*, 502–515.
- Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (1991b). Social psychological influences on sensation seeking from adolescence to adulthood. *Personality and Social Psychology Bulletin, 17*, 701–708.
- Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (1993). Cognitive motivations and sensation seeking as long-term predictors of drinking problems. *Journal of Social and Clinical Psychology, 12*, 1–24.
- Stacy, A. W., Newcomb, M. D., & Bentler, P. M. (1995). Expectancy in mediational models of cocaine use. *Personality and Individual Differences, 19*, 655–667.
- Stacy, A. W., Sussman, S., Dent, C. W., Burton, D., & Flay, B. R. (1992). Moderator of peer social influence in adolescent smoking. *Personality and Social Psychology Bulletin, 18*, 163–172.
- Stacy, A. W., Widaman, K. F., & Marlatt, G. A. (1990). Expectancy models of alcohol use. *Journal of Personality and Social Psychology, 58*, 918–928.
- Stein, J. A., Newcomb, M. D., & Bentler, P. M. (1987a). Personality and drug use: Reciprocal effect across four years. *Personality and Individual Differences, 8*, 419–430.
- Stein, J. A., Newcomb, M. D., & Bentler, P. M. (1987b). An 8-year study of multiple influences on drug use and drug use consequences. *Journal of Personality and Social Psychology, 53*, 1094–1105.

- Steinberg, L., Mounts, N. S., Lamborn, S. D., & Dornbusch, S. M. (1991). Authoritative parenting and adolescent adjustment across varied ecological niches. *Journal of Research on Adolescence, 1*, 19–36.
- Stice, E., & Barrera, M. (1995). A longitudinal examination of the reciprocal relations between perceived parenting and adolescents' substance use and externalizing behaviors. *Developmental Psychology, 31*, 322–334.
- Stice, E., Barrera, M., & Chassin, L. (1993). Relation of parental support and control to adolescents' externalizing symptomatology and substance use: A longitudinal examination of curvilinear effects. *Journal of Abnormal Child Psychology, 21*, 609–629.
- Teichman, M., Barnea, Z., & Ravav, G. (1989a). Personality and substance use among adolescents: A longitudinal study. *British Journal of Addiction, 84*, 181–190.
- Teichman, M., Barnea, Z., & Rahav, G. (1989b). Sensation seeking, state and trait anxiety, and depressive mood in adolescent substance users. *The International Journal of the Addictions, 24*, 87–99.
- Thomas, G., Farrell, M. P., & Barnes, G.M. (1996). The effects of single-mother families and nonresident fathers on relinquency and substance abuse in black and white adolescents. *Journal of Marriage and the family, 58*, 889–894.
- United States Department of Education. National Center for Education Statistics (1996). *Dropout rates in the United States: 1994*, NCES 96–863. Washington DC: Government Printing Office.
- Vega, W. A., Apospori, E., Gil, A. G., Zimmerman, R. S., & Warheit, G. J. (1996). A replication and elaboration of the esteem-enhancement model. *Psychiatry, 59*, 128–144.
- Vega, W. A., & Gil, A. G. (1998). *Drug use and ethnicity in early adolescence*. New York: Plenum Press.
- Vega, W. A., Gill, A. G., & Wagner, E. (1998). Cultural adjustment and hispanic adolescent drug use. In W. A. Vega & A. G. Gill (Eds.), *Drug use and ethnicity in early adolescence* (pp. 125–148). New York: Plenum Press.
- West, S. G., & Aiken, L. S. (1997). Toward understanding individual effects in multicomponent prevention programs: Design and analysis strategies. In K. J. Bryant, M. Windle, & S. G. West (Eds.), *The science of prevention: Methodological advances from alcohol and substance abuse research* (pp. 167–210). Washington, DC: American Psychological Association.
- Wills, T. A. (1994). Self-esteem and perceived control in adolescent substance use: Comparative tests in concurrent and prospective analyses. *Psychology of Addictive Behaviors, 8*, 223–234.
- Wills, T. A. (1986). Stress and coping in early adolescence: Relationships to substance use in urban school samples. *Health Psychology, 5*, 503–529.
- Wills, T. A., & Cleary, S. D. (1999). Peer and adolescent substance use among 6th–9th graders: Latent growth analyses of influence versus selection mechanisms. *Health Psychology, 18*, 453–463.
- Wills, T. A., Vaccaro, D., & McNamara, G. (1994). Novelty seeking, risk taking, and related constructs as predictors of adolescent substance use: An application of Cloninger's theory. *Journal of Substance Abuse, 6*, 1–20.
- Windle, M. (1996). Effect of parental drinking on adolescents. *Alcohol Health and Research World, 20*, 181–184.
- Wingard, J. A., Huba, G. J., & Bentler, P. M. (1980). A Longitudinal analysis of personality structure and adolescent substance use. *Personality and Individual Differences, 1*, 259–272.
- Zimmerman, M., A., Ramierz-Valles, J., Zapert, K. M., & Maton, K. I. (2000). A longitudinal study of stress-buffering effects for urban African-American male adolescent problem behaviors and mental health. *Journal of Community Psychology, 28*, 17–33.
- Zuckerman, M. (1979). Sensation seeking: Beyond the optimal level of arousal. Hillsdale, NJ: Erlbaum.