Psychosocial predictors of drug use initiation and escalation: an expansion of the multiple risk factors hypothesis using longitudinal data

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Virtually every study of teenage drug use, regardless of its quality, design, or sample, has failed to confirm fully any specific etiological theory. Further, no single variable has been empirically established as *the* important predictor of alcohol and drug use among teenagers. Rather than being a failure of behavioral science, these results may in fact reflect the true nature of teenage drug involvement. Recently a multiple risk factor perspective has been advanced as a more meaningful way to understand and explain teenage drug use. From this perspective, drug use is not viewed as a specific vulnerability, nor seen to be generated by single causal factors. Rather, the likelihood of teenage drug involvement is predicted to increase in relation to the amount of vulnerability and/or quantity of risk a teenager faces. While the empirical work on the multiple risk factor model has been very promising, some limitations of this approach have been noted, and the developmental aspects of these risk conditions have been largely ignored.

One serious limitation is a too general or global conception of risk, not based on the type of substance or nature of drug involvement. Specifically, not all risk factors may operate or influence with equivalent force or salience on all types of substances nor at all levels of drug involvement. In this study, we confront this possible limitation by conceptually categorizing individual risk factors (based on previous theory and research) into those most likely to influence drug use initiation and licit drug involvement and those risk factors most likely to predict increased, exacerbated, or heavy drug

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involvement with multiple and illicit substances. To place the present study in a proper theoretical and empirical context, two areas of concern are briefly reviewed below. First, we provide a summary of the general multiple risk factor model for drug use. Second, we review some of the developmental considerations that may be tied to a risk factors approach. These reviews are followed by a description of how we addressed these concerns and issues in the present study.

Summary of risk models

Although the empirical literature is replete with psychosocial correlates of drug abuse of modest magnitude, no one has been able to develop "a single empirically weighted predictive instrument that can make reliable predictions as to who will or will not engage in drug abuse" (Lettieri, 1975, p. 3). Single-factor prediction models account for little variance in actual drug use behavior, poorly predict changes in drug use across time, and are often inconsistent for different populations (Bry, 1983a; Pentz, 1985; Sadava, 1975). Bry and her colleagues (Bry, 1983a; Bry, McKeon & Pandina, 1982) proposed that drug use should be considered a general rather than a specific coping mechanism, dependent on how much rather than exactly what there is to cope with. From this perspective, drug use is best predicted from the number of risk factors rather than the salience of any one predictor or specific constellation of etiologic forces. In this view, individual etiological pathways to drug use are as numerous as the number of users—a concept borrowed from psychopathology (Nathan & Harris, 1980).

Bry and her colleagues (Bry et al., 1982; Bry, Pedraza & Pandina, 1987) have suggested an alternative view, the Multiple Risk Factors Hypothesis, which reconciles some of the problems encountered in predicting adolescent substance use in terms of differing etiological influences. Utilizing both cross-sectional and longitudinal data, they have demon-

strated that a single unit-weighted risk index was linearly and monotonically related to severity of drug use (as measured by a single substance use index). No single combination of risk factors accounted for drug use better than any other set; rather, the total number of risk factors was the best predictor of actual drug use both cross-sectionally and longitudinally. Unfortunately, the longitudinal nature of the data was under-utilized, which compromised the importance of their findings. Specifically, no statistical controls were included for baseline levels of drug use, which reduces the findings to across-time associations with little predictive meaning (e.g., Newcomb, 1987).

Newcomb, Maddahian, and Bentler (1986) corrected a number of the shortcomings of the Bry et al. (1982; Bry et al., 1987) research. Newcomb et al. dichotomized risk factors on a conceptual (combined theoretical and empirical) rather than purely empirical basis (Bry et al. derived cutoff points based on population-specific associations with drug use). Newcomb et al. also examined specific types of drug use (i.e., cigarettes, alcohol, cannabis, a composite hard drug index, and nonprescription medication) and statistically controlled for baseline drug use to predict changes in drug use patterns over time. A larger set of risk factors (ten opposed to six) was selected, and risk-proneness was defined as the extreme quartiles of risk (a zero for no-risk and a one for risk).

Findings from Newcomb, Maddahian, & Bentler (1986) revealed three important patterns: (1) magnitude of risk was related to increased concurrent use of cigarettes, alcohol, cannabis and hard drugs; (2) dramatic differences in the number of risk factors were found for light compared to heavy users of cannabis and hard drugs; and (3) the risk factor index significantly predicted increased use of alcohol, cigarettes, cannabis, and hard drugs over a one-year period. Overall, as Newcomb et al. (1986) point out, the unique effects due to the risk index in terms of proportion of

variance were relatively small; however, the unit-weighted risk index increased significantly the predictive power beyond knowledge of prior drug use.

More recently, Newcomb, Maddahian, Skager, and Bentler (1987) expanded their risk index to include 12 risk factors. Newcomb et al. (1987) reported that correlations between the risk index and cocaine and hard drug use were lower than those for cigarettes, alcohol, and cannabis. Several alternative explanations for these patterns were proposed that do not detract from the risk factor notion but do suggest ways that it can be expanded and refined. For instance, a single risk factor composite may not be equally predictive of both problematic use of hard drugs and the experimental use of drugs more commonly practiced by teenagers (e.g., alcohol). This latter finding suggests the importance of distinguishing etiological patterns of drug use (e.g., Chassin, 1984; Fleming, Kellam & Brown, 1982; Simcha-Fagan, Gersten & Langer, 1986; Spotts & Shontz, 1985).

Developmental considerations

Kandel's developmental stage model (Kandel, 1978; Kandel & Faust, 1975; Kandel, Kessler & Margulies, 1978) suggests that different etiological influences are most salient at different developmental periods (Kandel et al., 1978; Kandel & Logan, 1984). Thus prevention strategies should target many, if not all, of the risk factors that predict first use, continued use, and transitional use to deter progress into greater drug involvement (Hawkins, Lishner & Catalano, 1985; Lohrmann & Fors, 1986; Segal, 1986; Winick, 1985). Further, the greatest impact, parsimony, and cost-effectiveness could be achieved by targeting those specific risk factors most salient for each specific stage of drug involvement.

One important omission in previous studies of teenage risk factors for drug involvement is a failure to consider empirically the evolving condition of risk over time. In the present

study we use two-wave panel data to study the developmental stability and cross-influences of our multiple risk factor indices at two points in time. Thus we can begin to understand the evolving developmental trajectory of cumulative risk conditions for involvement with drugs as a teenager. Our data are from a school-based sample of young teenagers (seventh grade at first wave of data), who are in a particularly critical life-period for the establishment of personal attitudes toward using drugs and actual drug use behavior.

Several intriguing directions are suggested from these earlier studies. A single unit-weighted risk index to predict all types and degrees of drug use may be too general. Separation of risk factors into those that predict experimental drug use and those that predict more problematic drug use has not been attempted but is a necessary next step. In commenting on the utility of risk factor models, Labouvie, Pandina, White, and Johnson (1990) pointed out that a "potential problem exists that such models become more empirically than theoretically oriented both in terms of specific risk factors that are sampled and specific cut-off points that are selected to indicate the presence of a risk" (p. 4). While this comment is certainly an important caution, careful research can test and advance theory and not simply articulate mere exploratory results. In the present study, cut-off points are selected to maximize exposure to high risk, variables are chosen from credible theories, and risk factors are assigned to indices based on sound conceptual distinctions.

Importance of this research

This research extends previous research in several ways. First, a larger set of risk factors is used to predict five types of drug use; while previous risk models utilized at most 12 risk factors, this research included 29 possible risk factors. Second, objective measures of school-based deviancy were obtained from school records. Though previous research has

confirmed the relationship of deviance to drug use, most studies have relied on self-report measures (e.g., Elliott, Huizinga & Ageton, 1985; Jessor & Jessor, 1977; Johnston, O'Malley & Eveland, 1978). Third, two conceptually distinct risk indices were created, one containing risk factors to predict initiation/experimental drug use and one containing risk factors to predict more problematic/heavy drug use. This sorting procedure relied upon the Jessor & Jessor (1977; Jessor, 1986) definition of proximal and distal influences, along with consideration of the findings from prior research on the developmental progression of drug use (e.g., Kandel, 1978). Factors that previously demonstrated a stronger relationship to heavy drug use were assigned to the problematic index, while the remaining factors composed the initiation/experimental risk index. Fourth, panel data were used to assess the stability of risk and the reciprocal associations between the two dimensions of risk at two points, allowing inferences regarding developmental patterns of risk. Finally, the sample used was young adolescents, which enabled the investigation of developmental phenomena related to health and risk-coping mechanisms at an early period of risk and vulnerability.

Method

Design and sample

The data for this study were obtained as part of a school-based drug education program conducted in Napa, California, between 1979 and 1984. Documentation and design of the original study can be found in Moskowitz, Schaps, Schaeffer and Malvin (1984), Moskowitz, Malvin, Schaeffer and Schaps (1983) and Schaps, Moskowitz, Malvin and Schaeffer (1986). No data were collected on ethnicity and socioeconomic status, although local census data indicate that the Northern California community is predominantly white and middle class.

A self-report survey of psychosocial, behavioral, and attitudinal assessments was administered to a cohort of seventh graders (T1: N = 717) and repeated two years later with all students in the ninth grade (T2: N = 486). These sample sizes reflect a subset of the total number of middle school students in the original Napa Project. Selection of this cohort was based on our interest in this critical life period and the ability of the researchers to track these students prior to their transition from middle school into high school. Selecting those who participated at both waves resulted in a panel sample of 311 students, whose data are used in most analyses. Fifty-two percent of the baseline sample were females, while 55% were females in the panel sample.

Measures

Items in the survey assessed self-concept (SOS; Self Observation Scales; Stenner & Katzenmeyer, 1975), students' affect toward classroom/school environments (IOX; Instructional Objectives Exchange—Student Sentiment Index, 1972), locus of control for academic failure and success (CIAR; Crandall Intellectual Achievement Responsibility Questionnaire; Crandall, 1978; Crandall, Katkovsky & Crandall, 1965), and the Drug and Alcohol Survey (DAS; Moskowitz, Schaeffer, Condon, Schaps & Malvin, 1981).

The DAS assesses both lifetime and past month use of alcohol (sum of beer, wine, and liquor items), cigarettes, marijuana, cocaine, and hard drugs (a sum of stimulants, depressants, psychedelics, inhalants, and heroin items). For the present analyses, the T1 assessments of drug use were based on lifetime prevalences. Scaling for these items ranged from "never" (1) to "100 or more occasions" (6). At follow-up in ninth grade (T2), measures of past month drug use were used and were measured on a five-point scale ranging from "none" (1) to "20 or more occasions" (5). It is quite possible, when using different time frames for the drug use measures, that there may be some reduction in their sensitivity, especially for the recency of use measure. The shorter

tions for locus of control for Success (alpha = .89) and one for Failure (alpha = .89). Scale intercorrelation was .36 ($p < .001$), which was consistent with recent standardization specifications (Crandall, 1978).

The DAS contains 14 established scales assessing students' attitudes toward drugs, perceptions of peer use of drugs, perceptions of peer attitudes towards drugs, knowledge regarding the effects of drugs, and perceived positive benefits and negative consequences of drug use (Moskowitz et al., 1981). For the attitudinal items, separate three-item soft-drug (alcohol, cigarettes, and marijuana) and seven-item hard-drug scales were formed at each wave. Reliability estimates ranged from a low of .60 for Attitudes Toward Soft Drugs to a high of .98 for Perceived Peer Use of Hard Drugs. Average reliability for these scales was .88. Consistent with earlier findings, Cronbach's alpha for the drug knowledge scale was .31 (Moskowitz et al., 1981). The low internal consistency for this scale required that it be removed from further analyses.

Attrition analyses

Multiple regression analyses were conducted to determine if attrition in sample size from T1 to T2 was due to any systematic influences. Sample attrition was moderately related to prior drug use behavior and attitudes. Those students who did not continue in the study reported more marijuana use (beta = .21), believed less in the negative consequences of marijuana use (beta = .16), and had higher numbers of deviant problems (beta = .10). Paradoxically, these same students had less "riskier" attitudes toward drugs in general (beta = −.09) and less tolerant attitudes toward gateway drugs (beta = −.18). Zero-order correlations between attrition and these latter measures did not reveal a suppressor effect.

period for the past month use measure may represent a more random, and thus less stable, indication of drug use patterns.

Information about problem behavior was gathered from school records as an objective measure of deviance (damage or theft of school property or private property, physical aggression against students or teachers, truancy, and possession and/or use of drugs). Drug violations were systematically deleted from the measure of deviance to eliminate the potential confound between risk factors and drug use.

Factor analyses of the psychosocial measures

Between the baseline assessment and later data collection points, some changes were made in the response formats of the items from several scales (e.g., from dichotomous to four-point Likert scale), and some items were deleted at T2, which precluded mean comparisons between assessment points. However, sufficient numbers of items remained at post-test to reconstitute, as closely as possible, the measures from the baseline assessment. The factor structure of the psychosocial scales was established for this sample in a series of analyses. Maximum likelihood factor analysis with oblique rotations was used to reduce the original psychosocial and attitudinal items into statistically reliable factors. Internal consistency for these scales was obtained using Cronbach's alpha. We use T1 reliability estimates (N = 717) as a basis for future scale determination, since reliability is a quality of the scale for a particular population. Therefore, the best population estimate relies on the larger sample size.

Eight scales were created for the measure of self-concept (SOS), with alphas ranging from a low of .75 for Academic Performance to a high of .91 for Peer/Friendship Bonding. Average reliability for these scales was .84. Five scales were derived from the IOX measure, with internal consistency estimates ranging from a low of .83 for Perceived Freedom in School to a high of .95 for Bonding to Teacher. Average reliability for these five scales was .90. Two scales were derived from the CIAR, one assessing students' attribu-

Results

Selection of risk factor composites: multiple regression analyses

It is important to retain only those risk factors that account for a unique portion of the variance in the drug use measures. As Newcomb et al. (1987) point out, some risk factors may be so highly correlated that a reduced and more parsimonious set may yield results equivalent to the entire set. This concern is supported by the large correlations among several of the attitudinal, utilities, and riskier attitudes toward drugs measures.

To select those risk composites that account for unique portions of variance in the drug use measures, a series of multiple regression analyses was run using all 29 risk scores as predictors and the five individual drug use scores as the dependent measures. Separate analyses were run for each of the five types of drug use (alcohol, cigarettes, marijuana, cocaine, and hard drug use). If a risk factor accounted for a significant portion of the variance in any one of the analyses, it was retained.

Preliminary regression analyses revealed that self and perceived peer attitudinal items accounted for a large portion of the variance in the five criterion measures. Consequently, other psychosocial measures became nonsignificant in predicting drug use. This presented a quandary, since the literature is not clear on whether behavior predicts attitudes or vice versa (e.g., Ajzen & Fishbein, 1980; Bem & Allen, 1974; Bentler & Speckart, 1981; Flay, DiTecco & Schlegel, 1980). Therefore, we conducted a series of regression analyses omitting the attitudinal items to determine which of the remaining psychosocial measures significantly predicted drug use. For the final analyses, both the attitudinal items and those psychosocial measures that significantly predicted drug use were retained for subsequent analytic procedures. The number of deviant problems (a unit-weighted summed index) was not significant in any of the regression analyses, but it was retained on conceptual and theoretical grounds.

Multiple correlations for alcohol, cigarettes, and marijuana were somewhat larger than for cocaine and hard drugs. Concurrent analyses revealed that 35% of the variance (all equations significant at the $p < .001$ level) in T1 alcohol use was accounted for by five T1 predictors: riskier attitudes toward drugs, negative utilities of alcohol, orientation toward success, academic performance, and positive school climate. Similarly, five predictors accounted for 44% of the variance in cigarette use: riskier attitudes toward drugs, negative utilities for marijuana, negative utilities for pills, peer affect toward school, and affiliation with children. Six predictors accounted for 49% of the variance in marijuana use: riskier attitudes toward drugs, negative utilities for alcohol, and for both marijuana and pills, both the negative and positive utility items. Four predictors accounted for 19% of the variance in cocaine use: riskier attitudes toward drugs, positive utilities for marijuana, peer affect toward school, and locus of control for failure. Likewise, four predictors accounted for 21% of the variance in hard drug use: riskier attitudes toward drugs, positive utilities for pills, happy/dysphoria, and locus of control for failure. We caution, however, that the extreme skews for cocaine and the hard-drugs scales may have attenuated the multiple correlations.

Some researchers have suggested that gender should be considered as a risk factor, based on the empirical confirmation that males typically engage in higher levels of drug use than females (Johnston, O'Malley & Bachman, 1988; Newcomb et al., 1987). To test this hypothesis, a series of multiple regression analyses was run in which the risk factors were entered first as a block followed by the addition of gender in the second step of the equation (e.g., Newcomb et al., 1986). Gender increased the accountable variance by a fraction of a percent for each of the five criterion measures. In light of these findings, gender was not included as a risk factor in further analyses.

Dichotomization of risk factors

Table 1 lists the final set of predictors along with reliability estimates, means, and cutoff points utilized in the dichotomization procedure. Cutoff scores were based on the Newcomb et al. (1986) extreme 25th percentile criterion and were based on the seventh grade sample for T1 predictors and on the ninth grade sample for the T2 predictor set. A subject was considered "at risk" and given a "1" if he met this criterion and a "0" if he failed to meet the risk criterion. Percentages of students in upper quartiles of risk are also indicated.

Conceptual separation of risk factor indices

Following the dichotomization of all the risk scores, two unit-weighted, summed indices of risk factors were created. Conceptual assignment of each risk factor to one of the two indices was based on a careful examination of relevant literature reviewed in the introduction. Six risk factors were assigned to the initiation/experimental risk index: Peer/Friendship Bonding, Affiliation with Children, Academic Performance, Positive School Climate, Perceived Freedom in School, and Peer Affect Toward School. All of these factors have been previously implicated as predictors or concomitants of experimental drug use, while few have been associated with more problematic drug use.

Based upon prior research, we believed that consolidation of self-attitudes and perceptions of peer attitudes toward drug use would result from the actual use of drugs. Opportunities to formulate opinions regarding peer use and peer attitudes toward use should follow direct experience with and modeling of use. Therefore, we hypothesized that knowledge of the positive or negative functions of drug use would develop from repeated use beyond mere experimentation and might lead to more problematic use. Thus, all the attitudinal (both self and perceived peer) risk factors were assigned to the problematic risk index (this is similar to the Jessors' definition of proximal drinking-specific variables). This same argument was used to assign the measure of Riskier Attitudes Toward Drugs to the problem index. This latter variable

TABLE 1
Summary statistics and cutoff points for risk factor composites

Risk Factor Composite[a]	T1 (N = 717) Alpha[b]	T1 Mean	T1 Percent at risk	T1 Cut point	T2 (N = 481) Mean	T2 Percent at risk	T2 Cut point
Initiation/experimental risk factors							
Peer/Friendship Bonding (14)	.91	1.7	23.5	< 1.57	3.1	33.4	< 2.88
Affiliation with Children (3)	.82	1.7	38.6	< 1.67	--[c]	---	---
Academic Performance (12)	.91	1.7	17.4	< 1.60	2.9	12.5	< 2.50
Positive School Climate (9)	.85	1.7	16.4	< 1.44	2.6	24.1	< 2.25
Perceived Freedom in School (5)	.83	2.4	17.0	> 2.75	2.4	24.1	> 2.50
Peer Affect Toward School (11)	.91	2.6	22.2	< 2.33	2.4	22.8	< 2.25
Problem/heavy risk factors							
Happy/Dysphoria (10)	.84	1.8	24.4	< 1.78	3.1	12.2	< 3.00
Bonding to Teacher (17)	.95	2.6	21.0	< 2.40	2.6	17.4	< 2.42
Orientation to Success (3)	.76	1.8	41.8	< 1.67	---	---	---
Locus of Control Failure (9)	.89	1.7	40.0	> 1.88	1.8	23.8	> 1.90
Riskier Attitudes Toward Drugs (17)	.92	2.1	26.4	> 2.53	2.4	24.4	> 3.06
Negative Util for Alcohol (5)	.82	1.9	21.2	> 2.40	2.2	24.1	> 2.71

Negative Util for Pills (5)	.88	1.6	24.4	> 2.00	1.7	20.0	> 2.20
Positive Util for Pills (8)	.97	1.5	21.0	> 1.87	1.6	21.5	> 1.87
Negative Util for Marijuana (5)	.90	1.8	18.0	> 2.40	2.1	22.2	> 2.60
Positive Util for Marijuana (8)	.96	1.7	18.3	> 2.25	1.9	19.6	> 2.50
Perceived Peer Attitude Toward Soft Drugs (3)	.92	2.7	18.0	> 3.67	3.2	11.0	> 4.00
Perceived Peer Attitude Toward Hard Drugs (3)	.95	1.9	25.7	> 2.78	2.1	25.4	> 2.71
Perceived Peer Use of Soft Drugs (3)	.93	3.3	28.0	> 4.33	4.2	21.5	> 5.00
Perceived Peer Use of Hard Drugs (7)	.98	1.9	21.2	> 2.28	1.9	21.0	> 2.28
Number of Deviant Problems (7)	--[d]	2.4	3.2	> 3.00	2.3	6.1	> 3.00

[a] Number in parentheses represents number of items in the factor.
[b] Internal consistency coefficients were computed using the complete T1 sample.
[c] Some items are present at T1 only.
[d] This scale is a unit-weighted summed index of problems.

assesses extent of approval for the use of drugs regardless of consequences or circumstances.

The measures of Orientation Toward Success (or lack thereof), Locus of Control for Failure, and Bonding to Teachers (or lack thereof) were consistent with measures from the motivational-instigational structure elucidated in problem behavior theory (Jessor & Jessor, 1977) and should predict problematic drug use as well. In addition, the measure of Happy/Dysphoria was consistent with Paton, Kessler & Kandel's (1977) early work, which demonstrated a relationship between depressive mood and illicit drug use during adolescence. Finally, many data exist linking deviant problems and problematic drug use, and we assigned this measure to the respective risk index.

Drug use patterns

Table 2 contains summary descriptive statistics for the drug use scales for the panel sample at T1 and T2. Alcohol was the most commonly used substance at T1, with 75% of the seventh graders (corresponding to 12–13 years of age) indicating any lifetime use of alcohol. Cigarette use was next most prevalent, with 59% indicating use of cigarettes at least once. Twenty-one percent reported use of marijuana, 6% had used cocaine, and 16% had tried at least one of the hard drugs. At T2 when these same students were in the ninth grade, 62% had consumed alcohol in the past month, and 30% had smoked cigarettes. In addition, 24% had smoked marijuana in the past month, while 6% had used cocaine, and 12% had tried hard drugs in the past month.

Chi-square tests indicated that some prevalence rates changed over time, though the different time frames for the two assessments make these results difficult to interpret; lifetime for T1 and past month for T2 (e.g., Newcomb & Bentler, 1986). The apparent declines in consumption may also reflect effects of the original Napa intervention program (Moskowitz et al., 1983; Moskowitz et al., 1984; Schaps et al., 1986). These results must also be read with caution, since

the Napa research program based its analyses of treatment effects on modality of treatment as opposed to grade or year of administration.

As summarized in Table 2, point-biserial correlations between gender and the five drug use measures indicated that females used cigarettes more frequently in both seventh and ninth grades. At T2, males used alcohol and marijuana more often, though these differences were slight. The differences in use patterns, however slight, cautioned against our collapsing the data across sex, and subsequent analyses were conducted on the total sample and by sex as well.

General distributions of the risk indices

The number and percentage of subjects receiving each of the counts for the four risk indices are presented in Table 3. As expected, distributions for the four risk indices were characterized as positively skewed, with decreasing numbers of students having greater numbers of risk factors. Marginals are similar for both males and females, and overall are consistent with those from Bry et al. (1987) and Newcomb et al. (1986, 1987).

For RFINIT1, the initiation/experimental index at T1, the mean number of risk factors for the entire sample was 1.3 (SD = 1.2). At T2 (RFINIT2), the mean for this same index was 1.2 (SD = 1.2) for the entire sample. For RFPROB1, the problem/heavy index at T1, the mean number of risk factors was 3.5 for the entire sample (SD = 2.7), and at T2 (RFPROB2) the mean for the entire sample was 2.7 (SD = 2.7).

Mean comparisons by sex revealed statistically significant differences for both indices at T1. In addition, chi-square tests revealed a significant association between gender and the initiation/experimental risk index at T1. For the remaining risk indices, all other tests of sex differences were nonsignificant. Although it appears that gender does influence the number of risk factors for initiation to drug use,

TABLE 2
Summary descriptive statistics for drug use items

	Panel Cases T1			
	Lifetime Use Measure			
Drug Index	Percent ever use	Mean	Standard deviation	r_{pbi} sex difference[1]
Alcohol	74.9	2.7	1.4	-.05
Cigarettes	58.5	2.3	1.5	0.15*
Marijuana	20.6	1.5	1.2	-.00
Cocaine	5.8	1.1	0.5	0.01
Hard drug[2] index	16.1	1.1	0.3	-.02

Distributions for T2 Panel Sample[3]

Drug Index	Past Month Use Measure: Percent ever use	Mean	Standard deviation	r_{pbi} sex difference[1]	χ^2 T1-T2
Alcohol	62.1	2.1	1.0	-.13	36.5***
Cigarettes	29.6	1.8	1.4	.19***	37.1***
Marijuana	23.8	1.6	1.2	-.12*	30.5***
Cocaine	5.8	1.1	0.5	-.06	9.5**
Hard drug index	11.9	1.1	0.3	-.02	5.8*

NOTE: N = 311 for both T1 and T2.

[1] Positive point-biserial correlation indicates that the female subjects had the larger value.

[2] Composite of pills (sedatives and stimulants), inhalants, psychedelics, PCP, and heroin.

[3] Males N = 139; females N = 170.

* $p < .05$; ** $p < .01$; *** $p < .001$.

TABLE 3
Number of risk factors for panel sample and by sex

Number of Risk Factors	Longitudinal Sample (%)	Sex		t-value	χ^2 value
		Male (%)	Female (%)		
	RFINIT1 (Initiation/Experimental Use at T1)				
	N = 311	N = 140	N = 171		
0	90 (28.9)	28 (20.0)	62 (36.3)	2.32*	10.7*
1	99 (31.8)	50 (35.7)	49 (28.7)		
2	70 (22.5)	34 (24.3)	36 (21.1)		
3	35 (11.3)	20 (14.3)	15 (8.8)		
4	9 (2.9)	4 (2.9)	5 (2.9)		
5	8 (2.6)	4 (2.9)	4 (2.3)		
	RFPROB1 (Problem/Heavy Use at T1)				
0	20 (6.4)	10 (7.1)	10 (5.8)	-2.22*	6.7^{ns}
1	71 (22.8)	36 (25.7)	35 (20.5)		
2	49 (15.8)	26 (18.6)	23 (13.5)		
3	42 (13.5)	21 (15.0)	21 (12.3)		
4	28 (9.0)	10 (7.1)	18 (10.5)		
5	27 (8.7)	10 (7.1)	17 (9.9)		
6	29 (9.3)	13 (9.3)	16 (9.4)		
7	17 (5.5)	2 (1.4)	15 (8.8)		
8 or more	28 (9.1)	12 (8.5)	16 (9.4)		

RFINIT2 (Initiation/Experimental Use at T2)					
0	117 (37.6)	42 (30.0)	75 (43.9)	2.32*	8.9^{ns}
1	97 (31.2)	48 (34.3)	49 (28.7)		
2	47 (15.1)	21 (15.0)	26 (15.2)		
3	30 (9.6)	19 (13.6)	11 (6.4)		
4	17 (5.5)	8 (5.7)	9 (5.3)		
5	3 (1.0)	2 (1.4)	1 (0.6)		
RFPROB2 (Problem/Heavy Use at T2)					
0	63 (20.3)	26 (18.6)	37 (21.6)	0.97	6.3^{ns}
1	65 (20.9)	30 (21.4)	35 (20.5)		
2	64 (20.6)	24 (17.1)	40 (23.4)		
3	35 (11.3)	15 (10.7)	20 (11.7)		
4	23 (7.4)	15 (10.7)	8 (4.7)		
5	15 (4.8)	8 (5.7)	7 (4.1)		
6	9 (2.9)	4 (2.9)	5 (2.9)		
7	9 (2.9)	7 (5.0)	2 (1.2)		
8 or more	28 (8.9)	11 (7.9)	17 (9.9)		

NOTE: Degrees of freedom for the initiation indices were 4, and for the problem risk indices, 6.
* $p < .05$.
ns = nonsignificant.

these analyses are entirely exploratory, and little prior research is available for confirmation of directional differences (Bry et al., 1987; Labouvie et al., in press; Newcomb et al., 1986, 1987). However, this finding seems a logical explanation for the often-observed pattern of greater drug use for males than for females.

Associations between risk indices and substance use

We have hypothesized that a summed unit-weighted index of initiation risk factors would be a better predictor of experimental drug use than a problem/heavy risk index that would be more strongly associated with problematic drug use. In other words, for those students already engaged in some use of drugs in the seventh grade, the problem/heavy risk index should predict greater involvement concurrently, as well as an increase in drug use over the two-year period. On the other hand, for students who reported no use in the seventh grade, the initiation/experimental risk index should best predict their drug use behaviors in the ninth grade.

We computed zero-order and point-biserial correlations between the risk indices and drug use frequency measures and different user/nonuser categories delineated below. This information enables us to examine the statistical association between the risk indices and drug use.

These correlations are presented as part of Table 4. The problem risk index was strongly and significantly associated with the five types of drug use. Only for marijuana and hard drug use were significant correlations obtained for the initiation risk index. Again, analyses by gender were consistent with those findings from the panel sample. Neither risk index was associated with male alcohol use, and no significant correlation was obtained for alcohol or marijuana use and the initiation risk index. Results for female drug use paralleled those of the complete sample except for hard drug use, where only the problem risk index was significantly correlated.

Associations among psychosocial and behavioral measures are typically stronger for cross-sectional than for longitudinal data. These data comport with this general expectancy in that the longitudinal associations for T1 nonusers and T2 drug use were mostly nonsignificant and small in magnitude. Of interest, for both the panel sample and females, the associations between hard drug use and both risk indices were significant, though moderate. For males, however, only the correlations between the problem risk index and marijuana and hard drug use were statistically significant.

Consistent with the aforementioned expectancy, cross-sectional correlations for users at T1 and at T2 drug use and the problem risk index were of greater magnitude and, more often than not, statistically significant. Male cocaine use was not associated with either risk index. Moreover, neither risk index was associated with female marijuana, cocaine, and hard drug use.

Longitudinal associations between use status at T1 and drug use at T2 indicated that the initiation risk index was moderately associated with alcohol use at T2 for the panel sample and likewise for males. No other significant associations were obtained for the initiation risk index, and the correlations for cocaine use for the male and female samples were affected by extremely small sample sizes, which makes their interpretation somewhat tenuous.

The relative salience of each risk index in predicting initiation to and maintenance or exacerbation of the five types of drug use was assessed by multiple regression analysis, using T1 risk indices as independent measures and both T1 and T2 drug use separately as criterion measures. We first conducted cross-sectional analyses for the entire panel sample, regressing T1 drug use on the two T1 risk indices. For this and one other analysis, drug use was coded as use or non-use at T1 and logistic regression was used, which is more robust when using dichotomous criterion measures. Model chi-squares

TABLE 4
Regression analyses and product moment correlations with T1 risk indices and T1 and T2 criterion measures[1]

	Alcohol	Cigarettes	Marijuana	Cocaine	Hard
	Cross-Sectional Analysis: Predicting T1 Use Versus Nonuse[2]				
Total Sample; N =	311	311	311	311	311
Model χ^2	15.8[b]	48.0[c]	108.6[c]	64.8[c]	57.7[c]
RFINIT1 Beta	-.04 (.05)	-.17 (.04)	-.18 (.11[a])	-.31 (.04)	.02 (.13[a])
RFPROB1 Beta	.24[b](.22[c])	.40[c](.38[c])	.67[c](.59[c])	.72[c](.44[c])	.42[c](.43[c])
Males Only; N =	140	140	140	140	140
Model χ^2	2.8	20.8[c]	49.4[c]	37.2[c]	29.0[c]
RFINIT1 Beta	-.06 (.00)	-.21(-.01)	-.16 (.06)	.17 (.14)	.36 (.23[b])
RFPROB1 Beta	.15 (.14)	.42[c](.37[c])	.66[c](.59[c])	1.16[b](.51)	.40[c](.43[c])
Females Only; N =	171	171	171	171	171
Model χ^2	15.2[b]	28.4[c]	62.9[c]	33.7[c]	35.4[a]
RFINIT1 Beta	-.09 (.09)	-.19 (.09)	-.29 (.15[a])	-.63 (-.01)	.33 (.05)
RFPROB1 Beta	.33[a](.30[c])	.41[c](.40[c])	.77[c](.60[c])	.65[c](.40[c])	.49[c](.44[c])

Longitudinal Analysis: Predicting T2 Use Versus Nonuse for Nonusers at T1					
Total Sample; N =	78	129	247	293	261
Model χ^2	1.5	1.6	6.0[a]	2.7	15.2[b]
RFINIT1 Beta	.04 (.04)	-.27(-.06)	-.24(-.05)	-.09 (.00)	.28 (.16[b])
RFPROB1 Beta	.16 (.13)	.16 (.07)	.20[a](.12)	.17 (.09)	.24[b](.22[c])
Males Only; N =	34		110	134	118
Model χ^2	.04	N/A	6.7[a]	1.2	7.3[a]
RFINIT1 Beta	.06 (.03)	N/A	-.27(-.06)	-.15(-.03)	.22 (.09)
RFPROB1 Beta	-.02(-.01)	N/A	.31[a](.22[a])	.16 (.09)	.34[a](.23[b])
Females Only; N =	44	71	137	159	143
Model χ^2	4.5	1.3	2.9	2.3	8.8[a]
RFINIT1 Beta	-.43(-.06)	-.29(-.05)	-.37(-.07)	-.11 (.02)	.36 (.22[b])
RFPROB1 Beta	.55[a](.28)	.18 (.08)	.19 (.08)	.23 (.12)	.17 (.20[a])
Cross-sectional Analysis: Predicting T1 Frequency of Use for T1 Users					
Total Sample; N =	233	182	64	18	50
R^2	.12[c]	.25[c]	.11[a]	.12	.18[b]
RFINIT1 Beta	.01 (.11)	-.01 (.14)	-.00 (.07)	-.21(-.07)	-.26(-.17)
RFPROB1 Beta	.35[c](.35[c])	.51[c](.50[c])	.33[b](.33[b])	.36 (.29)	.40[b](.34[a])

TABLE 4 CONTINUES

TABLE 4 (continued)

	Alcohol	Cigarettes	Marijuana	Cocaine	Hard
Males Only; N =	106	82	30	6	22
R^2	.15[b]	.29[c]	.39[b]	.10	.33[a]
RFINIT1 Beta	-.03 (.06)	.15 (.27)	.15 (.27)	-.16(-.20)	-.37(-.29)
RFPROB1 Beta	.39[c](.38[c])	.48[c](.52[c])	.58[b](.61[c])	.24 (.27)	.51[a](.45[a])
Females Only; N =	127	100	34	12	28
R^2	.13[b]	.22[c]	.02	.23	.10
RFINIT1 Beta	.00 (.15)	-.08 (.11)	-.14(-.12)	-.53(-.18)	-.23(-.10)
RFPROB1 Beta	.35[b](.36[c])	.50[c](.47[c])	.08 (.05)	.56 (.23)	.32 (.23)
Longitudinal Analysis: Predicting T2 Frequency of Use for T1 Users					
Total Sample; N =	233	182	64	18	37
R^2	.07[b]	.13[c]	.06	.02	.05
RFINIT1 Beta	.18[a](.22[c])	-.06 (.06)	.23 (.23)	.12 (.14)	-.19(-.13)
RFPROB1 Beta	.14[a](.20[b])	.37[c](.35[c])	.01 (.06)	.04 (.09)	.15(-.14)
Males Only; N =	106	82	30		
R^2	.17[c]	.09[a]	.10	N/A	N/A

RFINIT1	Beta	.34[b](.38[c])	.14 (.20)	.24 (.28)	N/A	N/A
RFPROB1	Beta	.17 (.25[b])	.22[a](.26[a])	.17 (.22)	N/A	N/A
Females Only; N =		127	100	34		
R^2		.04	.17[c]	.05	N/A	N/A
RFINIT1	Beta	-.02 (.06)	-.16 (.01)	.22 (.20)	N/A	N/A
RFPROB1	Beta	.21[a](.19[a])	.44[c](.38[c])	-.09(-.04)	N/A	N/A

NOTE: N/A = Not available due to small sample size (<5/cell).

[1] Numbers in parentheses are zero-order correlations. Point biserial correlations were used for analyses with dichotomous criterion measures.

[2] Model χ^2 and betas are reported for logistic regression analyses.

[a] $p < .05$; [b] $p < .01$; [c] $p < .001$.

were significant for all five types of drug use. Consistently, as depicted in Table 4, the problem risk index predicted the five types of drug use with betas ranging from a low of .24 for alcohol to .72 for cocaine use.

Next, in order that we might determine the importance of risk in predicting initiation to use, we limited our analyses to only those students who had never used a substance at T1 and regressed their drug use at T2 on the two risk indices from T1. Table 4 contains the results of these and all other regression analyses for the entire sample and by sex. Contrary to our original hypothesis regarding initiation to drug use, for the two significant predictive models the problem risk index predicted initiation over the two-year period. Only marijuana and hard drug use had significant model chi-squares for the complete sample. No deviation from these results was encountered for the male sample; however, the problem/heavy risk index significantly predicted female alcohol and hard drug use but not marijuana use.

Next, we conducted a series of analyses to test the hypotheses regarding maintenance and exacerbation of drug use both cross-sectionally and over the two-year intervening period. For these analyses we selected those students who reported any use of a substance in the seventh grade. We first regressed the frequency of use in the seventh grade on the two risk indices at T1 and then regressed drug use at T2 on the two risk indices at T1.

The results of these first analyses mostly confirmed our hypothesis that the problem/heavy risk index better predicted maintenance or exacerbation of use than the initiation index. Except for cocaine use, significant regression coefficients and multiple correlations were obtained for alcohol, cigarette, marijuana, and hard drug use. When this analysis was conducted for each sex, similar regression patterns were obtained for the five types of drug use. Regression coefficients and multiple R's for the problem/heavy risk index

were significant for alcohol, cigarettes, marijuana, and hard drugs, though for marijuana and hard drug use only for males. These results are for the most part consistent with the analyses conducted for the entire sample, but the small sample sizes in the separate gender analyses may caution against their generalizability.

Next, we tested the same hypothesis using longitudinal data by using only students reporting use at T1 for each of the five types of drug use and regressing frequency of use at T2 on the two T1 risk indices. This analysis enabled us to assess the relative importance of the problem/heavy risk index compared with the initiation index for predicting changes in drug use patterns from seventh to ninth grade.

Unlike the cross-sectional analyses, these results did not generally confirm the greater strength of the problem/heavy risk index in predicting evolving drug use patterns. For the entire sample, both Tl risk indices significantly predicted increased frequency of alcohol use at T2, while only the problem/heavy risk index significantly predicted increased cigarette use at T2. Neither risk index significantly predicted T2 marijuana, cocaine, or hard drug frequency of use. When these same analyses were repeated for each sex, the results deviated somewhat from those for the complete sample. For males, the initiation risk index significantly predicted increased T2 frequency of alcohol use, while the problem risk index significantly predicted increased T2 cigarette use frequency.

On the other hand, the problem risk index for females significantly predicted increased T2 alcohol and cigarette frequency of use. No significant regression effects were obtained for T2 frequency of marijuana use for either sex, and these same regression analyses for cocaine and hard drug use by gender were tentative due to extremely small samples.

)evelopmental trajectory of risk

Aside from the association between the two risk indices and drug use both within and across time, of further interest are the individual relationships among the risk indices both within and across time. The magnitude of these relationships is an indication of construct validity, and we are able to assess whether these risk factors function separately or together as inseparable and developmentally intertwined.

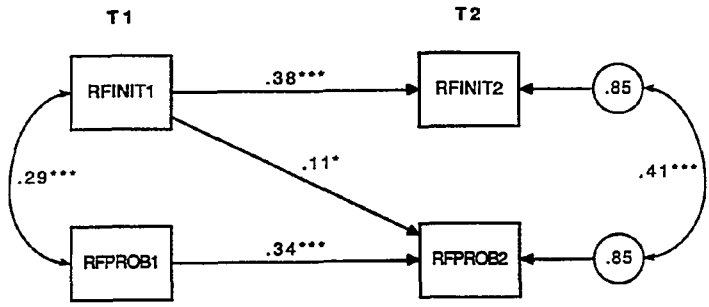
First, concurrent dissimilarity is evidenced by the modest association between the T1 risk indices ($r = .29$, $p < .001$). Second, the largest correlation among the four risk indices was between the initiation and problem risk indices at T2 ($r = .43$, $p < .001$). The increasing strength of these relationships between conceptually dissimilar risk indices may be related to a developmental consolidation among the constellation of behaviors that constitute these disparate indices during these formative years of adolescence.

On the other hand, stability of psychological risk was indicated by the moderate associations between similar indices across time (RFINIT1-RFINIT2: $r = .38$. $p < .001$; RFPROB1-RFPROB2: $r = .37$, $p < .05$). In addition, conceptual divergence is reinforced by the correlations between dissimilar indices across time (RFPROB1-RFINIT2: $r = .11$, $p < .05$; RFINIT1-RFPROB2: $r = .21$, $p < .001$).

In order to assess the relative influence of early risk on later risk behaviors, we conducted a path regression analysis using the same four risk indices. This analysis enabled us to apply appropriate statistical controls and to isolate the developmental trajectory of risk. Figure 1 contains the results of the path analysis using the EQS statistical program (Bentler, 1989). A covariance matrix among the four risk indices was input for this analysis. Double-headed arrows between the measured indices are correlations, while single-headed arrows are unidirectional influences interpreted as standardized regression path coefficients.

As depicted in the figure, T1 risk indices were moderately related, while the same relationship at T2 was greater (designated by the correlation between the residual terms at T2). Of importance to our original hypothesis regarding development and stability of risk over time in adolescence are the paths between similar indices across time and the cross-lagged path from RFINIT1 to RFPROB2. Both the initiation/experimental and the problem/heavy risk indices at T2 were influenced by their earlier counterparts. Conversely, the problem risk index at T1 had no influence on the initiation risk index at T2. However, higher risk for initiation/experimental use at an early age increased risk for problem/heavy use two years hence, as depicted by the path from RFINIT1 to RFPROB2; though significant, this effect was relatively small.

FIGURE 1
Path regression equation for risk indexes



LEGEND: Rectangles represent measured risk indexes, and small circles with numbers are residual variances. Curved lines represent within-time covariances, while single-headed arrows represent unidirectional influences. Path coefficients are standardized. Significance levels for path coefficients were determined by critical ratios on unstandardized coefficients [*p <.05; ***p <.001].

Discussion and conclusion

A substantial body of literature points to the need to distinguish predictors of initiation and experimental drug use from more committed and problematic types of drug use. However, the evolving relationship between risk and drug use over time remains relatively unexplored. It is important to determine the factors that place some youth "at risk" for drug involvement and influence the development and stability of these vulnerabilities over time.

We hypothesized that youth at risk for initiation/experimental drug use would be characterized by low peer/friendship bonding, low affiliation with children, and little regard for their school work, academic performance, and academic skills, as well as not perceiving a positive school climate, freedom in school, and their peers' strong attachment to school. We also hypothesized that youth at risk for problem/heavy drug use would be characterized by a constellation of risk factors related to low happiness, little orientation to success, low bonding to teachers, high internality for failure, positive drug-related attitudes and behaviors, deviance problems, perception of few risks in and many benefits to the use of alcohol, pills, and marijuana, and perception that their peers approve and engage in gateway and hard drug use. The salience of the peer attitudes and peer use influences as risk factors for problem/heavy drug use is based on the assumption that these perceptions reinforce the influences of peer group characteristics on drug use behaviors (e.g., Clayton & Ritter, 1985; Kandel, 1986).

Evidence of convergent and divergent construct validity was demonstrated for the conceptual separation of the initiation/experimental and problem/heavy risk indices. For instance, the lower magnitudes of association between the dissimilar indices within and across time compared with the stronger associations of similar indices across time reinforce this position. The larger within-time correlations patterns

between risk indices at T2 compared with T1 may suggest increasing stabilization of both psychosocial and behavioral vulnerabilities to drug use as reflected in the risk factor indices, in the developmental transition from seventh to ninth grade.

A more complete picture of the relationship of risk to the five types of drug use was assessed using zero-order and point-biserial correlations between the four risk indices and the five types of drug use. These results reinforced the salience of the problem/heavy risk index, which was significantly correlated with all five types of drug use for the complete panel sample. However, several significant (though small to moderate in magnitude) associations between the initiation/experimental risk index and drug use were apparent. Specifically, this index was related to marijuana and hard drug use for the complete sample, as well as males-only hard drug use and females-only marijuana use.

In addition, hard drug use was positively associated with risk for initiation for the complete sample for nonusers at T1 who initiated use at T2. Similar results were obtained for female nonusers who initiated use by T2, though not for males. We speculate that the use of hard drugs did little to ameliorate these youths' disenfranchised condition, as evidenced by the constellation of factors underlying the initiation/experimental risk index. Rather, these youths remained aloof from the social nexus of friends and school while intensifying their drug use (e.g., Kaplan, 1975; 1980).

Finally, for youths already consuming alcohol in the seventh grade, both risk factors were positively associated with alcohol consumption in the ninth grade, for the complete sample and for males. Again, it would appear that a larger set of risk factors from the combined risk indices underlies a propensity to engage in alcohol consumption.

By separating users and nonusers of five different substances at such an early age, we were able to assess the relative importance and contribution of various risk factors to initiation and problematic drug use both cross-sectionally and longitudinally. For those students who reported no drug use in the seventh grade, we hypothesized a stronger predictive relationship between the initiation/experimental risk index at T1 and T2 drug use than for the problem/heavy risk index. On the other hand, for students reporting some use in the seventh grade we hypothesized a stronger predictive relationship between the problem/heavy risk index and frequencies of use for the five types of drugs, both concurrently and longitudinally, than for the initiation risk index.

Results of these analyses confirmed the salience of the problem/heavy risk index in predicting both drug use exacerbation and initiation of drug use, for both the complete sample and males and females separately. While these findings support our hypothesis for the salient predictor of drug use exacerbation, our hypothesis regarding the initiation risk factor index was not supported. For those students who had already initiated drug use in the seventh grade, the problem/heavy risk index significantly predicted increased frequencies of alcohol, cigarette, marijuana, and hard drug use, but not cocaine use. Similar patterns were found for males, though not for females.

Based on the results of the longitudinal analyses, both risk indices were somewhat complicit in predicting alcohol use, and the problem/heavy risk index predicted cigarette use, but neither index predicted increased use of marijuana, cocaine, or hard drugs. For the analyses conducted separately by sex, greater predictive strength was noted for the problem/heavy risk index in the female sample, though these results require further verification due to small samples.

Furthermore, when longitudinal analyses were conducted using only those students who had never used drugs in the

seventh grade, significant predictive models were obtained only for marijuana and hard drug use. Both for the complete sample and for females only, the problem/heavy risk index was the salient predictor.

Two implications arise from these results. First, those risk factors that constitute the problem/heavy risk index are clearly more strongly related to drug use increases among those youths already using drugs in the seventh grade. Second, the problem/heavy risk index is also more strongly predictive of initiation to drug use by their nonusing peers. It is quite possible that these results may indicate the overpowering predictive strength of the attitudinal items in the problem/heavy risk index, a quandary we mentioned earlier (e.g., Bentler & Speckart, 1981). In addition to the strength of the attitudinal items are students' perceptions of peer use and their perceptions of peer attitudes toward use, both of which are strongly predictive of students' own use and initiation to use. Nonetheless, the causal relations of these psychosocial variables to drug use still remain somewhat enigmatic. One other possibility that may underlie the strong associations between the problem/heavy risk index and drug use is that we have conceptualized our risk indices inappropriately. This certainly warrants further investigation.

Adolescence has long been recognized as a critical developmental period of massive social, emotional, physical, and cognitive growth (Erikson, 1968; Havighurst, 1972). This critical stage in life represents a fertile period in which lifestyle choices are made that can lead to healthy or to troubled adulthood. Adolescence is also an essential period of life when health-related stress coping mechanisms are developed. The search for remedies to assuage the enormous strains of disequilibrium experienced during adolescence can result in socially disruptive and health-engendering behaviors. Ideally, youths in the late adolescent transitional years should develop coping mechanisms that make them impervious to the effects of risk-engendering behaviors. However, it

appears that increasing exposure to conditions of risk endangers and undermines the development of these coping mechanisms, at least in regard to the vulnerability to use drugs. This finding is supported by the stabilities of the two risk indices between T1 and T2, as well as the cross-lagged influence from risk for initiation at T1 to risk for problem/heavy drug use at T2. It is worth noting, however, that differences in number of items comprising each index at T1 and T2 may reduce the stabilities for these constructs, which if identical might have been stronger.

The risk factor methodology represents a multiple pathway conceptualization of adolescent drug use and suggests a need for different prevention strategies tailored to specific high-risk groups. Bry (1983b) stated: "This conceptualization, however, has implications for the development of substance abuse preventive interventions. It suggests that no single modality, no most effective prevention program, will be found. Multiple causation calls for multi-faceted prevention programs, perhaps a different approach for each psychosocial precursor" (p. 158).

Educational intervention strategies that target multiple risk factors (e.g., Segal, 1986) and are aimed at specific high-risk groups may help inoculate individuals from entry into a drug using/abusing lifestyle. Differentiating patterns of risk for drug use is critical in the development of heuristic primary prevention strategies and the ultimate implementation and success of these strategies.

Several limitations of the present research should be noted. Measures of alcohol and drug use were based on self-reported frequencies and did not include any information on quantity, severity, or duration of use. Others have suggested that such information makes possible more refined discrimination between categories of use and abuse, further contributing to clearer etiological models (e.g., Douglass, Khavari & Farber, 1981; Newcomb, 1989; Newcomb & Bentler, 1989a;

Pandina, White & Yorke, 1981). Moreover, heavy or regular use was atypical behavior for this young sample, although certain drug use patterns were established even in this youthful cohort. Nonetheless, similar research with samples in older age ranges needs to be conducted. Drug use at this young age may be more random and less intentioned than at older ages and thus less systematically related to psychosocial risk factors. Drug use itself may not be constant and stable (e.g., Newcomb & Bentler, 1986) but will increase with age.

Furthermore, these youths are best described as just beginning to experiment with various illicit substances, with a significant concentration around the "gateway" drugs. The kurtoses and skew for cocaine and hard drug use were quite high and confirmed that these substances are not commonly used by this youthful cohort. This verified our decision to combine most hard drug items into a summary scale to maximize the available variance. A number of researchers have utilized similar combinations of hard drug use in their analyses (e.g., Huba, Wingard & Bentler, 1981; Kandel et al., 1978; Newcomb et al., 1987; Single, Kandel & Johnson, 1975). Combining hard drug types eliminated the differentiability of the individual hard drugs, but it improved the psychometric properties of the scales. Limited use of hard drugs may be related to their potent pharmacological properties, to the availability of these highly illegal and often expensive drugs, and to the relative inexperience with drugs of this youthful sample. Although normally regarded as a type of hard drug, cocaine was kept separate in light of recent attention and concern given to this drug and its unique psychoactive properties.

Reliable gender differences in drug use have not been consistently found in the literature (e.g., Jessor & Jessor, 1978; Johnston et al., 1988; Miller & Cisin, 1983; Stein, Newcomb & Bentler, 1986). Often females report higher levels of cigarette use at younger ages, and in some cases higher levels of stimulant use, while males report greater consumption of

alcohol, marijuana, and most other drugs. Our data reveal higher cigarette consumption for females in both the seventh and ninth grades, and show males to use more alcohol at both points in time. Moreover, by conducting analyses separately by sex, we were able to verify quite similar patterns and a few findings revealing different patterns of risk for drug use for males and females.

Although large, attrition over the two-year period was similar to that in other studies conducted in educational settings (Stein, Newcomb & Bentler, 1987) and should not have seriously distorted our results. Attrition patterns for actual drug use behaviors and proclivity toward deviance are consistent with previous research, though the differences in outcomes for the attitudinal variables may be specific to this sample (e.g., Kandel, 1975, 1978; Kandel & Faust, 1975). For example, we found that students who dropped out had higher drug use levels and poorer perceptions of the negative consequences of drug use.

It is important to learn more about the influences and processes that place some youths at risk for developing dysfunctional behaviors during early adolescence, while others are protected from such vulnerabilities. The present analyses suggest that different vulnerabilities may underlie use and abuse of drugs among teenagers (Newcomb & Bentler, 1989b); this requires further research.

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