Psychosocial, Motivational, and Contextual Profiles of Youth Reporting Different Patterns of Substance Use During Adolescence[1]

Alison L. Bryant
University of Missouri

Jacquelynne S. Eccles and Arnold Sameroff
University of Michigan

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ABSTRACT

This study examines various patterns of substance use and profiles of academic beliefs and behaviors during adolescence among a predominantly African American sample of 733 youth from a metropolitan area. Youth were classified into high, moderate, or no substance use groups based on their alcohol, cigarette, and marijuana use in 11th grade and classified as users, initiators, desistors, and nonusers based on their use in both 8th and 11th grades. Few differences were found between the moderate users and those who reported no use in 11th grade and between initiators and nonusers or users in terms of psychosocial, motivational, and peer and parent factors in 8th grade. White students (in comparison to African American students) and students who reported school misbehavior in 8th grade were more likely to report high substance use than be moderate or low substance users in 11th grade and they were more likely to be users at both grades than nonusers at both grades or initiators. In addition, students who reported in 8th grade that they are depressed, place high importance on being popular, or who have few friends who do well in school reported high substance use rather than no use in 11th grade. Students who misbehave and have few achieving friends were more likely to be users than nonusers at both grades. Cluster analysis of students reporting alcohol, cigarette, or marijuana use at both grades revealed that a prevalent group of users included students reporting higher grades, higher social goals, and having more friends who do well in school compared to average levels in the sample. Other clusters included adolescents with high grades/high risk, low grades/low risk, school misbehavior, and depression.

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BACKGROUND

Adolescents share many similar experiences in school and with their friends and families, yet these experiences differ in their effects upon youth. When these experiences are aggregated across youth to examine their effects on adolescent outcomes, researchers can identify salient markers with particular outcomes. Previous studies have focused on the relations among variables, examining how levels of risk factors are associated with different levels of outcomes on average. For example, high levels of truancy are associated with more cigarette use on average among adolescents (Bryant, Schulenberg, Bachman, O'Malley, & Johnston, 2000). Pattern-centered approaches, rather than considering relations among variables, consider how people differ in their profiles across different variables. These approaches reveal diverse patterns of linkages between risk factors and outcomes. For example, Wils, McNamara, Vaccaro, and Hirky (1996) found groups of substance users who differed in their academic and behavioral competence, indicating that all substance users are not alike. The current paper focuses on how youth differ in their patterns of substance use and examines the variety of experiences among youth reporting substance use.

Given the diversity of adolescents' substance use experiences—multiple research approaches are necessary to capture this complexity. The variable-centered approach has been the predominant approach to examine adolescent substance use, where risk factors and protective factors are associated with higher or lower average substance use (or rates of change in use) across adolescents. In a pattern-centered approach, groups of individuals who are similar in their functioning can be distinguished from other groups. In the current study, individual functioning related to academics and substance use is assumed to be related to adolescents' psychosocial background, their motivational system, as well their perceptions of the beliefs and behaviors of their parents and peers. Patterns of substance use in 11^{th} grade, patterns of change in substance use between 8^{th} and 11^{th} grades, and clusters of youth who report substance use at both 8^{th} and 11^{th} grades are considered among a sample of primarily African American and white youth from diverse socioeconomic backgrounds in a metropolitan area.

Patterns of Substance Use and Other Behaviors During Adolescence

Researchers have used clustering and other classification techniques to identify groups of adolescents based on substance use and other health behaviors, motivation and perceptions of school, and risk profiles for school dropout. Zimmerman and Maton (1992) considered different life-style clusters of delinquency, school, employment, and religious activities among a sample of African American males from an urban environment (70% of the sample left school before graduation). They found that clusters of *delinquent*, *employed*, and *uninvolved* youth used more substances than youth in

the *church* or *in-school* groups. Similarly, Dishion and Loeber (1985) found, in a primarily white sample of adolescents, that nondelinquent drug users and nondelinquent abstainers from alcohol and marijuana did not differ from each other in their parental monitoring, maternal alcohol use, or their association with deviant peers. Both groups, however, were significantly different from delinquent drug users. The fact that common stereotypes of youth (e.g., high-achieving youth, substance users) may actually be quite different from each other in their experiences and attitudes can be revealed by clustering them across different domains.

Patterns of Change in Substance Use and Other Behaviors During Adolescence

To examine how groups of youth change over time, one can cluster individuals a) at the starting point and consider outcomes later in time; b) at the end point and consider how youth differ in their profiles of risk/protection before reaching the end point; or c) by how they change over multiple points in time. Cairns, Cairns, and Neckerman (1989) examined clusters of youth most vulnerable to high school dropout by clustering on early aggression and school failure and considering rates of dropout at a later point in time. Roeser, Eccles, and Freedman-Doan (1999) found that "endpoint" clusters of *multiple problems* and *poor motivation* adolescents could be followed back to decreased academic values and competence beliefs during childhood.

Researchers have used the third approach, identifying patterns of change over time, to consider different trajectories of substance use during adolescence and young adulthood. Using national panel data over four time points from ages 18 to 24, Schulenberg and his colleagues (1996) found five patterns of change in binge drinking in addition to youth who never report binge drinking. Comparing *chronic* and *decreased*, *fling* or *increased* and *rare*, and *increased* and *fling* groups, some of the age 18 predictors that distinguished more use over time from less use included less social conservatism and self efficacy, and more drinking to get drunk. Others have examined smoking during middle school and find that students who shift from no use to use of cigarettes a year or two years later had lower expectations for academic success, lower academic values, and lower academic achievement (Chassin et al., 1984; Jackson et al., 1998).

Types of Adolescent Substance Users: Disaggregating Clusters

One can also disaggregate groups of youth who share similar outcomes, or patterns of change (or stability). Examining the subclusters of youth within a group with similar outcomes (as opposed to clustering outcomes) can provide information regarding the multiple pathways to a common developmental outcome such as school dropout or substance use (e.g., Janosz, LeBlanc, Boulerice, & Tremblay, 2000). In a small sample of white high school seniors, Hughes, Power, and Francis (1992)

used cluster analysis to identify different groups of drinkers. Groups of youth included light drinkers who either drank at parties, with family, or on dates, and problem drinkers who drank alone and/or at school. The groups differed in their reasons for drinking and in the consequences of their alcohol use. Similarly, Farrell's (1990) qualitative research on youth at risk for school dropout in urban high schools suggests some youth use drugs to have fun with their friends, others use drugs for an escape, and others user drugs to get through school.

Profile Domains

In the current study, it is expected that different patterns of substance use will be associated with different profiles of risk across adolescents' psychosocial background, motivational and school-related beliefs, and their perceptions of their parents and peers.

Psychosocial Background

Adolescents with profiles of school failure, depression, and low self-esteem, who are concerned about being popular among their peers, are more likely than youth with fewer worries and negative school experiences to engage in risky patterns of substance use. Research has consistently indicated that youth with negative experiences in school, low achievement and high misbehavior are more likely to use alcohol, cigarettes, and marijuana (Brook, Whiteman, Balka, & Hamburg, 1992; Bryant et al., 2000; Hawkins, Catalano, & Miller, 1992). Popularity in peer groups has been associated with both prosocial and antisocial behavior in contrast with the *importance* adolescents place on being popular, which is more associated with problem behavior (Brown, Mory, & Kinney, 1994; Luthar & McMahon, 1996; Rodkin, Farmer, Pearl, & Acker, 2000). In terms of depression and self esteem, some adolescents may use substances to self medicate stress or depression (Sieffge-Krenke, 1995), and other youth may use substances for social reasons or to enhance their self-esteem (Eccles, Lord, Roeser, Barber, & Jozefowicz, 1997; Kaplan, 1985).

Motivational Factors

Adolescents who report that they go to school because they enjoy it, have expectations for continuing their education, and believe that school experiences are valuable are likely to avoid choices that jeopardize their chances for success in school, particularly when they perceive their beliefs to be strong relative to the views of other youth (Eccles, 1983). These beliefs may be direct protective factors (Brook, Whiteman, Balka, & Hamburg, 1992) or they may compensate for other risk factors. Costa, Jessor, and Turbin (1999) found that the risk effect of having friends who use substances is reduced when adolescents report that they have positive attitudes toward school and value academic achievement, although the main effect of having substance-using friends was only a marginally

significant predictor of heavy drinking among adolescents. Likewise, adolescents who go to school to see friends and meet other social goals are likely to do well in school when their choices fit with other learning goals (Wentzel, 1999). School is the place where much peer socialization takes place (Csikszentmihalyi & Larson, 1984) and adolescents may use school as an opportunity to use substances with peers (Eckert, 1989).

Peer and Family Influences

Adolescents who perceive that their peers, teachers, and parents have positive attitudes toward school are more resilient (Clark, 1983), have higher achievement (Eccles & Harold, 1993), and are less likely to use substances (Brook et al., 1992). If parents are involved with and have high educational expectations for their children, adolescents are less likely to use substances and more likely to do well in school (Frome & Eccles, 1998; Wills, Vaccaro, & McNamara, 1992). Getting along with teachers and receiving help from teachers is also important. A *burnout* from Eckert's (1989) study of a Michigan high school indicated that students were labeled as *burnouts* because, "...we didn't get along with the teachers", others in the group felt as though they were treated unfairly by teachers. Peer influences on substance use are likely to be stronger than parents or teachers during adolescence (Newcomb & Bentler, 1989). Youth who do poorly in school are more likely to spend time with delinquent youth who also do poorly and have unconventional values, and youth who do well in school are more likely to be friends with others who do well in school and avoid health risks (Hawkins et al., 1992; Hirschi, 1969).

Overview and Hypotheses

The current study examines the 8th grade profiles of a) youth reporting different levels of substance use in 11th grade; b) youth who exhibit different patterns of change in use between 8th and 11th grades; and c) different clusters of youth who report substance use at both 8th and 11th grades. The profiles of these groups of students are expected to be different in terms of their psychosocial background, motivational and school attitudes, and their perceptions of their environment. Youth reporting high levels of substance use in 11th grade, as well as those who report early initiation of substance use in 8th grade and continued use over time are expected to have more risky 8th grade profiles than youth who abstain from use, use moderately, or initiate substance use in 11th grade. Consistent with the findings of Wils and colleagues (1996), fewer differences are expected between moderate users or initiators, and adolescents who do not use substances in view of the fact that some experimentation with substance use during adolescence is now viewed as normative (Schulenberg & Maggs, 2000). It is also expected that cluster analysis of the substance-using group will reveal that

many youth in this group have positive profiles relatively free from risk.

METHOD

Sample and Procedures

The sample used for the analyses included 733 students who participated in the Maryland Adolescent Growth in Context Study (MAGICS) (PI: Dr. Jacquelynne Eccles) which began as one project of the MacArthur Foundation Research Network on Successful Adolescent Development (Chair, Richard Jessor). Students were from approximately 25 schools from in a large, ethnically diverse county near a large urban center on the east coast of the United States. Data were obtained from youth and their primary caregivers starting in 1991 when the students were in 7th grade. For the current study, only interview and questionnaire data from the target youth are used from the third and fourth follow-up waves (8th and 11th grades) (socio-economic status excepted, which was collected from the caregiver). Participants were African-American (58.4%), white (31.0%), or either biracial or other ethnic minorities (10.6%). The sample is evenly split by gender (51.9 % female). Primary caregivers reported mean incomes between $50-54,999 (ranging from under $5,000 to over $100,000). Trained interviewers conducted closed-ended, face-to-face interviews with students at home. During the home visit, the students also completed a self-administered questionnaire. Thomas Cook and his colleagues collected additional information regarding substance use and school misbehavior using surveys administered in schools at another time point in 8th grade; these measures are included in the current analyses. [MAGICS is comprised of a subsample of students from this larger study, see Cook, Shagle, and Degirmencioglu (1997).]

The original sample included 895 participants who had some data available from the Cook study and the current study in 8th grade. Of the 895 participants, 162 students were excluded because of missing data. T-tests and structural equation modeling (SEM) revealed that participants not included in the analyses because of missing data were somewhat from those included in the analyses, but the variances and relations among the variables were not significantly different.

Measures

Descriptives for all variables are reported in Table 1.

Socio-economic status (SES). When students were in 8th grade, their primary caregiver reported the occupations and educational levels of persons in their household, as well as their annual pre-tax income. The highest occupation status, highest educational level, and annual income were standardized and a standardized composite of SES was created (Alpha = .72).

Substance use

Substance use information was used from 7th and 8th grade reports and 11th grade reports.

Cigarette Use. In 7th and 8th grades, adolescents reported how many cigarettes they have smoked in the past 30 days. In 11th grade, adolescents reported how often they smoked cigarettes during the previous six months.

Alcohol Use. In 7th and 8th grades, adolescents reported how many alcoholic drinks they have had in the past 30 days. In 11th grade, adolescents reported how often they had alcoholic beverages to drink during the previous six months.

Marijuana Use. In 7th and 8th grade, adolescents reported how many times they smoked marijuana during the past 30 days. In 11th grade, adolescents reported how many times (if any) they have used marijuana (grass, pot, weed) or hashish during the previous six months.

Psychosocial Background

Academic achievement. At both 8th and 11th grades, participants reported how many A's, B's, C's, D's, and F's that they got on their first semester report card. A weighted average was computed such that A = 5, B = 4, C = 3, D = 2, and F = 1.

School misbehavior. This composite consists of a mean of students' reports in 8th grade of skipping classes, being sent to the principal's office for misbehavior, and cheating on tests or exams during the previous year (Cronbach alpha = .69).

Psychological well-being

All measures are students' reports in the 8th grade.

Depression. Students reported how they have felt and experiences they have had related to depression during the past two weeks. Possible responses ranged from 1 – 3. The composite is based on 14 items (Cronbach alpha = .86).

Self esteem. Students reported how much they wished they were different or could change things about themselves and how sure they are of themselves (3 items) (see Roser, Eccles, & Sameroff, 1998) (Cronbach alpha = .73).

Self perception of popularity. Students' reports of how good-looking they are, how good-looking they are compared to others, and how popular they are compared to others were used to create the composite (Cronbach alpha = .81).

Importance of popularity. Students reported the importance that place on being popular with black kids and with white kids (2 items), as well as the importance, compared to other kids, of sports and being good looking (2 items) (Cronbach alpha = .57).

Motivational Factors and School Attitudes

All measures are students' reports in the 8th grade. The motivation measures are related to Eccles' (1983) expectancy-value theory of achievement motivation.

Importance of school experiences. This composite consists of the mean of 5 items regarding the importance of school success and school activities (Cronbach alpha = .64).

Subjective task value. Students reported how important math and other school subjects are to them compared to how important they are for other kids (2 items) (Cronbach alpha = .81).

Meaningfulness of classes. Students' reports of the meaningfulness (3 items) of their experiences in social studies, math, English, and science (12 items total) were used to create an overall measures of the meaningfulness of adolescents' academic curriculum (Cronbach alpha = .75). Similar measures have been used by Roeser, Eccles, & Freedman-Doan (1999).

Social goals for school attendance. This is a single item measure of how important seeing friends at school is as a reason for going to school.

Learning goals for school attendance. This was a composite of 3 items relating to adolescents' learning goals (i.e., enjoy classes, like what I am learning, makes me feel smart) as reasons for going to school (Cronbach alpha = .76).

Academic self-concept. Students reported how well they do in math and other school subjects

(2 items) compared to other kids their age (Cronbach alpha = .68). Similar measures have been used by Roeser, Eccles, and Freedman-Doan (1999).

Expectations for schooling. Adolescents reported how far they think that they will actually go in school, possible responses ranging from 8th grade to professional degree (PhD, MD, or JD).

Fun at school. This is a single item measure of how often they have had fun at school during the previous two weeks.

Perceived Environment

Teachers unfair. This composite consists of adolescents' reports of how true it is that teachers treat students unfairly or only care about some students (4 items, Cronbach alpha = .80).

Parental school support. Adolescents reported how often they interact with their parent(s) relating to school or schoolwork (talking about problems, discussing schoolwork, checking work) and how much they enjoy these interactions (5 total items, Cronbach alpha = .78).

Parental expectations. Adolescents reported their perceptions of their parents' expectations of how well they will do academically and also how their schoolwork compares to other youth in their school (3 items, Cronbach alpha = .69).

Friends' positive school attitudes. This was a composite consisting of 9 items relating to adolescents' perceptions of whether their friends would think that academic success and abiding by school rules is cool (or uncool) (3 items) and whether their friends think that doing well and respecting teachers is important (6 items) (Cronbach alpha = .77).

Friends' positive school behaviors. Students reported whether their friends avoid school misbehavior and plan to go to college (5 items, Cronbach alpha = .65).

Data Analytic Approach

Logistic regressions were used to examine the effects of demographics, psychosocial background, motivation, and perceived environment on adolescents' odds of membership in different groups. The dependent variable, membership in one group compared to another group, is a dichotomy and one can consider the probability of being in one group versus another. Adolescents were grouped by their substance use in 11th grade and their substance use in 8th and 11th grades. In 11th grade, students were classified as being in a high substance use, moderate substance use, or no substance use group. For the substance use change groups, adolescents were classified as users, nonusers, initiators, and desistors.

Separate cluster analyses were performed on the group of students classified as users and also as nonusers (for comparison). K-Means cluster analyses were used to ascertain whether there were identifiable clusters, or subtypes, of youth distinct from other youth based on their psychosocial background, motivation, and/or perceptions of the experiences of their friends. The K-Means approach involves an iterative partitioning technique where individuals are successively partitioned into the specified number of clusters, where within-cluster differences are minimized and between-cluster differences are maximized (Aldenderfer & Blashfield, 1984).

RESULTS

Descriptive Statistics

Table 2 presents means and standard deviations for adolescents' alcohol, cigarette, and marijuana use at 8th grade (30 day use) and 11th grade (6 month use) by gender and ethnicity. Table 3 presents the correlations among all variables (significant correlations are in boldface).

Patterns of Substance Use in 11th Grade

Classification

Adolescents were classified into high, moderate, or no substance use groups in 11th grade based on their reported use of alcohol, cigarettes, and marijuana during the previous 6 months. Of the 733 students, 135 (18.4%) of the students were classified in the high substance use group. These students reported either a) using (more than just trying) cigarettes, alcohol, and marijuana; b) using one or more of the substances heavily; or c) using two of the substances moderately. Students reporting either using one of the substances moderately, or trying one, two, or all three of the substances during the previous 6 months were classified in the moderate substance use group ($N = 228$, 31.1%). Students were classified in the no substance use group only if they reported no substance use over the 6 month time period ($N = 370$, 50.5%). In the multivariate logistic regressions, 59 students (8.0%) were not included in the analyses because they were missing data on one or more of the predictors (listwise deletion of missing data is required for logistic regression).

As one would expect, youth in the different substance use groups differed in their alcohol, cigarette, and marijuana use at 8th and 11th grades ($p < .05$). The three different substance use groups did not differ in their composition of females [$\chi^2(2) = 2.84$, $p = .24$], though they differed in their composition by ethnicity [$\chi^2(4) = 38.51$, $p < .001$]. African Americans were over-represented in the no substance use group and whites were more prevalent in the high substance use group.

Predicting Membership

A series of univariate and multivariate logistic regressions were used to examine the individual effects of each of the predictors on the odds of being in the high substance use group compared to the moderate use group, the odds of being in the moderate use group compared to the no use group, and the odds of being in the high use group compared to the no use group.

Profiles of the three groups are presented in Figure 1 (z-scores are based on the entire sample). Briefly, the largest univariate differences (presented in Table 4) were between the high use and no use, and the high use and moderate use groups. Moderate users in 11th grade had very similar 8th grade profiles to those of nonusers in 11th grade. Among the strongest effects, high substance users reported

higher school misbehavior and social goals, and lower school importance, subjective task value, and friends' school attitudes and behaviors, than both moderate users and nonusers. Univariate results, however, did not control for background characteristics, nor did they account for the fact that many of the variables may overlap in their explanatory power, thus should be interpreted accordingly. The multivariate results are presented in Table 4 and below.

High substance use compared to moderate substance use. African American students were 3.6 times (1/.28) and other minorities 2.3 times (1/.44) more likely than whites to be moderate rather than high substance users. Students reporting school misbehavior 1 SD above the mean were 1.5 times more likely than those reporting average school misbehavior to be high rather than moderate substance users. Students 1 SD above the mean in terms of their subjective task value, in contrast, were 1.5 times more likely to be moderate rather than high substance users. Students who reported higher levels of depression were marginally more likely to be high substance users than moderate substance users compared to students who were less depressed. This multivariate model was a significant model, $\chi^2(23) = 71.94$, $p < .0001$, and the Nagelkerke $R^2 = 0.26$.

Moderate substance use compared to no substance use. The results indicated that females, rather than males, were marginally more likely to report moderate rather than no substance use (inconsistent with the nonsignificant contingency table analyses). Students who were 1 SD above the mean on subjective task value were 1.32 times more likely to be moderate substance users than report no substance use compared to students who reported average subjective task value (the univariate results suggest no relation, so this may be caused by some multicolinearity). The model, overall, was only barely a significant model, $\chi^2(23) = 36.07$, $p = .04$. The Nagelkerke $R^2 = 0.09$, suggesting few differences between the groups on the predictor variables.

High substance use compared to no substance use. Of the 11th grade comparisons, this model resulted in the best fit, and the predictors explained more of the variance in group membership: $\chi^2(23) = 121.72$, $p < .0001$ and the Nagelkerke $R^2 = 0.34$. The results indicated that students reporting high substance use rather than no use in 11th grade were less likely to be African American, more likely to report school misbehavior, depression, and high importance of popularity, and they were less likely to report that their friends do well in school.

Patterns of Change in Substance Use Between 8th and 11th Grades

Classification

Adolescents were classified into nonusers, initators, desistors, and users based on their reported use of alcohol, cigarettes, and marijuana during the previous 30 days at 8th grade and during the

previous 6 months at 11th grade. Of the 733 students, 13 students (1.8%) were missing substance use data at 8th grade and were not classified. The largest group of students (N = 265, 36.8%) were classified in the nonusers group; 157 (21.8%) initiated use between 8th and 11th grades and were classified as initiators; 97 (13.5%) did not report use at 11th after using during 8th and were classified as desistors; and 201 (27.9%) reported use at both time points and were classified as users. In the multivariate logistic regressions, 47 students (6.5%) were not included in the analyses because they were missing data on one or more of the predictors.

In terms of alcohol, cigarette, and marijuana use among these different groups, at 8th grade, desistors and users only differed in their alcohol use, with users reporting more alcohol use. At 11th grade, users reported higher alcohol, cigarette, and marijuana use than initiators. The three different substance use change groups did not differ in their composition of females [$\chi^2(3) = 4.46$, $p = .22$], though they differed in their composition by ethnicity [$\chi^2(6) = 27.48$, $p < .001$]. African Americans were over-represented in the nonusers group and whites were more prevalent in the users group.

Predicting Membership

A series of univariate and multivariate logistic regressions were used to examine the individual effects of each of the predictors on the odds of being an initiator compared to a nonuser, the odds of being a user compared to an initiator, and the odds of being a user compared to a nonuser. The smaller, desistors group was not included in the comparisons.

Profiles of the four groups are presented in Figure 2. The largest univariate differences (presented in Table 5) are between the users and nonusers. Fewer differences were found between initiators and nonusers, and initiators and users. The variables on which students were most likely to differ across the substance use groups were school misbehavior, depression, school importance, social goals, beliefs that teachers are unfair, and adolescents' perceptions of their friends' school experiences and attitudes. Again, univariate results should be interpreted with caution. As with the 11th grade substance use groups, the multivariate results (in Table 5) suggest few effects of the predictor variables in terms of changing students' odds of being in one group versus another. The results are summarized in the following sections.

Initiators compared to nonusers. Substance use initiators, in general, were very similar in their 8th grade profiles to nonusers—the model χ^2 was only marginally significant, $\chi^2(23) = 35.12$, $p = .051$, and the Nagelkerke $R^2 = 0.12$. African American students were half as likely to be initiators than nonusers in 11th grade (compared to white students). Students reporting school misbehavior in 8th grade 1 SD above the mean were 1.5 times more likely to initiate use than to remain nonusers in 11th grade

than youth with average school misbehavior.

Users compared to initiators. Initiators were somewhat different in 8th grade, however, from students who report using substances at both 8th and 11th grades. The model χ^2 was significant, $\chi^2(23) = 50.92$, $p < .001$, and the Nagelkerke $R^2 = 0.19$. The results indicate that white students were twice (1/.48) as likely (compared to African American students) to be users, students reporting school misbehavior 1 SD above the mean were 1.67 times more likely to be users, and students reporting their teachers are unfair and that their friends do not do well in well in school were marginally more likely to be users than students who initiate use between 8th and 11th grades.

Users compared to nonusers. African Americans were more than 5 times (1/.19) more likely than whites to be nonusers at both 8th and 11th grade than users at both time points. Students who were 1 SD above the mean in their reported school misbehavior were more than twice as likely as students average on school misbehavior to be users rather than nonusers. Youth who were 1 SD above the mean in terms of their perceptions of their friends' positive school experiences were 1.63 (1/.61) times more likely to be nonusers rather than users. Students who reported that school is important and that their friends think school success is cool in 8th grade only marginally improve their odds of being a nonuser rather than a user. This model resulted in the best fit of the change in substance use models [$\chi^2(23) = 151.75$, $p < .0001$], and the predictors explained more of the variance in group membership than the other models (Nagelkerke $R^2 = 0.39$).

Clusters of Substance Users

Identification of Clusters

To examine the heterogeneity of the user group – that is, students who report use of substances both at 8th and 11th grades—cluster analyses were performed. Distinct groups of users were identified by conducting a K-Means cluster analysis based on adolescents' 8th grade reports of grades, school misbehavior, depression, school importance, social goals for going to school, and friends' school behaviors (*z* scores were used). Cluster solutions 4 to 8 were examined on the two random half samples, and the 5-cluster solution was identified as having distinct groups that replicated in both samples. The n's were evenly distributed across these 5 clusters, which were more stable than other solutions. The 5-cluster solution from the entire sample of users mirrored the results from the random half samples. The resulting cluster groups from this solution were labeled *high grades/high risk, low grades/low risk, school misbehavior, depressed,* and *high grades/social goals.* The profiles of the users were presented in Figure 3. (The profile variables were *z*-scored based on the entire sample, not the user group only.)

Cluster Means

The clusters were created to maximize differences among the clusters across the cluster variables, so the means on these variables were different across the groups (see Table 6). The high grades clusters were highest on self-reported grades; the school misbehavior group was highest on school misbehavior; the depression group was highest on depression; the high grades/high risk group was high on risk factors, low on school importance and high on grades; and the high grades/social goals was low on risk factors (except social goals) and high on protective factors.

One-way ANOVA's were used to compare the groups in terms of their substance use at 8th and 11th grades (see Table 6). In general, the groups differed more in their 8th grade than their 11th grade substance use, and groups differed in their cigarette use more than their alcohol or marijuana use. The *school misbehavior* user cluster consistently reported the highest substance use, reporting significantly more cigarette and marijuana use in 8th grade than all of the other groups. At 11th grade, the *high grades/high risk, depressed,* and *school misbehavior* groups reported the same levels of all the substances. *The high grades/social goals* and *low grades/low risk* reported the least use across the 8th and 11th grade measures. This indicates that although all of the clusters report use at both 8th and 11th grade, their rates of use and the types of substances they use are not the same.

The clusters differed in their composition based on gender and ethnicity. An effect for gender was found, $[\chi^2(4) = 14.29, p < .01]$. Approximately the same numbers of males were in the groups, although more females were in the high grades/high social goals and the low grades/low risk groups. The cluster groups also differed in their makeup in terms of ethnicity, $[\chi^2(8) = 24.12, p < .01]$. Whites were most often in the high grades/high social goals and the high grades/high risk groups and African Americans were most often in the low grades/low risk and the depressed groups.

Comparison with Nonuser Clusters

Nonuser clusters were also created to examine whether the same or similar clusters could be found within this group. A 5-cluster solution was also the optimal solution for this sample. The clusters for this group were labeled *low grades/low risk, depressed, low grades/low school importance, high grades/high social goals,* and *high grades/low social goals.* The profiles of these clusters are presented in Figure 4. (The profile variables were *z*-scored based on the entire sample, not the user group only.) These results indicate, in general, that the low grades/low risk, depression, and high grades/high social goals groups can be found in both the users and nonuser groups. The high grades/high social goals groups were very similar among users and nonusers, the low grades/low risk group was more risky among users than among nonusers, and the nonusers depressed group was

somewhat more depressed than among users. There was little evidence for large school misbehavior or high grades/high risk groups among nonusers.

DISCUSSION

This study indicates that different types of substance users exist who exhibit various patterns of use and have diverse profiles early in adolescence. The univariate findings, in particular, support the hypotheses that few differences exist between 11th graders who report moderate use of substances and those who report no substance use, and between youth who initiate use between 8th and 11th grade and those who do not use at either time point. Eleventh graders who report high substance use exhibit more risky profiles than do youth who report moderate use or no use, and youth who report that they use substances at both 8th and 11th grades had more risky profiles than did students who never report use and those who initiate use between 8th and 11th grades. When multivariate analyses were performed to compare the discriminating power of the predictors in differentiating patterns of substance, many fewer differences were found, though the same basic conclusions hold. The results show that in 8th grade higher school misbehavior and having fewer friends who do well in school is associated with being in the high substance use group in 11th grade and in the group of adolescents who report using substances at both 8th and 11th grade. Dishion, Capaldi, and Yoerger (1999) similarly found many univariate predictors of alcohol, marijuana, and tobacco initiation during early adolescence, although in the full multivariate models, few of the family, peer, and individual factors were significant (there were many intercorrelations among predictors). It also may be that controlling for both academic achievement and school misbehavior may reduce the explanatory power of the motivation variables, because motivation is inextricably linked to both of these behaviors.

The results of the cluster analysis reveal diverse groups of adolescent substance users. The largest group of substance users included adolescents with above average grades and average levels of school importance, which could help to explain why fewer effects were found for these variables than was expected. Consistent with the hypotheses, both well-adjusted and problem behavior groups as well as depressed and not depressed groups of youth were identified. The results are discussed in more detail in the sections that follow.

Patterns of Substance Use in 11th Grade

The findings from the comparisons of the substance use groups indicate that 11th graders who have the highest substance use have profiles of behaviors and attitudes in 8th grade that are different from youth who report less or no substance use. Consistent with previous research (e.g., Bryant et al., 2000), adolescents who report high levels of school misbehavior in 8th grade were more likely to be

high substance users than were moderate users or nonusers. Heavy substance users may skip classes to use substances with their peers. Adolescents with lower academic skills who have negative experiences in school are more likely over time to hang out with peers who engage in misbehavior inside and outside the classroom (Dishion et al., 1999). The strong effects of school misbehavior may help to explain why academic achievement and the motivational factors were less predictive of substance use in 11th grade.

Having friends in 8th grade who are school oriented and who do well, on the other hand, was associated with a greater likelihood of being a nonuser, rather than a high substance user in 11th grade. Although peer groups change over time, the protective effects of associating with peers who do well in school and the risks of spending time with peers who are not school oriented extend over the four-year span of the study. Bauman and Ennett (1994) also suggest that one reason why the effects of peers is so strong, in addition to the fact that adolescents use the drugs together, is because adolescents attribute their own behavior to the behavior of their friends.

The comparisons between the high substance users and the nonusers indicates that 11th graders who report high substance use are more likely than nonusers to place importance on being popular in 8th grade. These students do not perceive themselves to be any more popular than nonusers in 8th grade, so they may use substances between 8th and 11th grades to try to fit in and be popular. This is consistent with findings that popular students exhibit both prosocial and antisocial behavior (Luthar & McMahon, 1996, Rodkin et al., 2000), "druggies" and "populars" are more concerned about popularity and hanging out with peers than other peer groups.

Patterns of Change in Substance Use

Results comparing youth who show different patterns of change in substance use were very similar to results from the 11th grade. There were even fewer differences between the initiators and nonusers than between the moderate users and the nonusers in 11th grade. This may be because some of the moderate users had initiated use in 8th grade and when youth initiate substance use after 8th grade, their 11th grade substance use rates are much lower than youth who have been using since 8th grade. Other research has also indicated that later initiation is associated with less use, in general (Hawkins et al., 1992). The model comparing initiators and nonusers was only marginally significant, and indicated only that African Americans were less likely to be initiators and students high on school misbehavior in 8th grade were more likely to initiate use. The strong effects of race on patterns of substance use as well as static levels of use is not surprising: Wallace and his colleagues (1995) found that African Americans who initiate substance use, initiate use later and use less than white youth. The

same results were found comparing users to initiators.

Of the substance use comparisons, the greatest differences were found between the students who report using substances at 8th and 11th grades compared to students who do not use at either time point. It is most clear from these analyses how the 8th grade profiles distinguish substance users and students who refrain from use. The findings confirm race difference in substance use (Wallace et al., 1995); African Americans are much less likely than white students. The findings also show how adolescents who act out and skip classes or who have friends who do poorly in school in 8th grade are more likely to be using substances in 8th grade and maintain that use through 11th grade. This fits with problem behavior theories that suggest that some students exhibit problem behaviors across multiple domains (e.g., school and peer environments) (Jessor & Jessor, 1977).

Clusters of Substance Users

The findings from the cluster analyses both confirm and add to the analyses predicting patterns of substance use. Finding common clusters between users and nonusers helps to explain why some of the 8th grade profile variables have less predictive power than expected. In contrast, finding clusters unique to the substance use group indicates clearer profiles of risk for substance use that could be targets for prevention. The *low grades/low risk, depressed,* and *high grades/high social goals* groups existed among both users and nonusers. For some low achieving students with no other strong risk factors, low grades poses a risk for substance use, and for others it does not. This helps us understand the small explanatory role that grades play in the other analyses. Among students who are depressed in 8th grade, some students use substances, others do not. Aseltine, Gore, and Colton (1998) also found distinct groups of depressed youth who did not use substances. This lends support for the mixed findings related to depression and self esteem as a risk factors for substance use and for Eccles' (1997) and her colleagues work where they find both increased and decreased self esteem associated with substance use (although here, in contrast with their work, both depressed groups were low achievers as well). The existence of high achieving youth with social goals among both the users and nonusers indicates that not all students who seek connections with their peers in school use substances. More importantly, the predominance of well-adjusted youth with social goals among substance users indicates prevention should be sure to target these youth as well as others who are more clearly at risk for substance use problems.

The cluster analyses illustrate that students who report high levels of school misbehavior in 8th grade are clearly at increased risk for substance use problems during high school. Among the substance users, these students report the highest levels of alcohol, cigarette, and marijuana use at 8th

and 11th grades. The cluster analyses reveal that high achieving youth may have profiles of risk and substance use as well. These youth have good grades, but also act out and skip classes, believe that school is not important, have social goals for school, and have friends who do poorly in school. Farrell (1990) suggested that even the most successful students skip school for an escape from boredom and from pressure. Academic achievement may act as a protective factor for youth, but this research suggests that it only does so together with other protective mechanisms.

Pattern-Centered Approaches

The analyses described in this chapter involved two types of pattern-centered approaches. The first approach, grouping youth by their patterns of substance use and predicting their group membership, shifted the focus from what would be average levels or average change in substance use in variable-centered approaches to examine how adolescents who use compare to those who do not. This study indicates that moderate substance user, or late initiators of use, differ very little (if at all) from those who abstain from use. Bigger differences were found between the high substance users and the adolescents who report moderate/no substance use, and the users and the initiators/abstainers. This reveals a nonlinear relationship, which may be harder to detect in variable centered approaches.

The second part of the study examined the heterogeneity of the substance user group using cluster analyses. Traditional variable centered approaches and also more pattern-centered approaches such as those used in the first part of the study would suggest that students who report substance use are primarily poorly adjusted youth who act out in school and experience difficulties in school—after all, these are the variables that are associated with each other. However, the processes that link poor adjustment, school problems, and substance use do not exist for all, or even most, students. The cluster analyses revealed that many of these students are well-adjusted high achievers. Examining groups of youth at either end of the spectrum of an outcome may help to uncover patterns in the data.

Limitations and Future Research Directions

The pattern-centered approaches used in this study are not without flaws. In the current study, the profiles of substance users are examined at only one point in time and patterns of change in substance use are examined at only two points in time. Nesselroade and Ghisletta (2000) have criticized pattern-centered approaches such as the one employed in the current paper that rely too heavily on the patterning of static measurements because there is much intra-individual variability over extended periods of time. This is particularly true during adolescence when maturational and psychosocial changes within the individual are paired with school, peer, and family contextual changes. The present research may be expanded further by examining the patterns of variability in substance use

within individuals over many more occasions, or by examining simultaneous change in substance use and other academic or motivational factors.

The measures of substance use in this study limited the accuracy of measuring change in use over time and may have masked unique patterns of predictors associated with different types of substances. Using the same measures over time and including lifetime measures of substance use would permit more accurate classification of adolescents by patterns of use. Looking at different patterns of alcohol, cigarette, and marijuana use separately may also reveal different patterns of risk and protective factors. Work by Kandel and Yamaguchi (1993) indicates that adolescents actually go through different stages of substance use involvement. This may help to account for the fact that some of the user clusters in this study have profiles of few risks.

This study illustrates how students who report high levels of school misbehavior and who have friends who are not doing well in school are more likely to initiate use and more likely to have used substances at both time points—yet we are left with little understanding as to why these students and their friends skip school and act out. Similar research that examines motivation, peer and family influences, antisocial behavior, and attitudes toward substance use among younger children followed longitudinally would allow us to consider how these behaviors and attitudes unfold over time.

Implications

Substance use has multiple meanings for different groups of adolescents. This research indicates that youth who report heavy use of substances are more likely to have profiles of risk early in adolescence, whereas those who delay use or use substances moderately are less likely to have profiles of risk. Although many students who report substance use appear to be doing well on other academic and psychosocial measures as early adolescents, their substance use is not without risk and it is likely to increase over time. As high achieving youth make the transition to college, they are more exposed to increased drinking and other substance use, more likely to engage in more use themselves, and run the risk of developing substance use-related problems or having their use interfere with their long term academic and work goals (Schulenberg & Maggs, 2000). Educating adolescents about alternative ways to meet their social goals, the risks associated with substance use, and how their beliefs about the prevalence of use among their peers and on college campuses may be inflated may protect them from increased use during the transition to college (Maggs, 1997). Pattern centered approaches in research can help illustrate to prevention researchers, teachers, and parents that there is no cure-all approach and that different approaches and types of interventions are needed to reach different types of adolescents.

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Table 1

Descriptives of 8th Grade Predictors, and 8th and 11th Grade Measures of Substance Use and Grades (N = 733).

Variables	N	Min	Max	Mean	SD	Skew	No. Of Items	Alpha
DEMOGRAPHICS								
African American[a]	733	0	1	0.58	0.49	-0.34	1	
Other Minority[a]	733	0	1	0.11	0.31	2.56	1	
Female	723	0	1	0.52	0.50	-0.07	1	
Socio-Economic Status	730	-2.3	2.2	0.07	0.81	-0.19	3	0.72
SUBSTANCE USE								
Alcohol Use (8th Grade)	693	1	7	1.69	1.29	2.08	1	
Cigarette Use (8th Grade)	692	1	6	1.20	0.61	5.93	1	
Marijuana Use (8th Grade)	706	1	7	1.12	0.74	5.01	1	
Alcohol Use (11th Grade)	731	0	5	0.92	1.39	1.58	1	
Cigarette Use (11th Grade)	723	1	7	1.48	1.03	2.57	1	
Marijuana Use (11th Grade)	731	0	5	0.66	1.41	2.20	1	
PSYCHOSOCIAL BACKGROUND								
Grades (8th Grade)	721	2.1	5	4.18	0.58	-0.66	NA[b]	
School Misbehavior	713	1	5	1.79	0.84	1.53	3	0.69
Depression	732	1	2.8	1.28	0.32	1.49	14	0.86
Self Esteem	733	1	5	3.89	0.89	-0.72	3	0.73
Perception of Own Popularity	732	1	7	4.97	1.18	-0.43	3	0.81
Importance of Being Popular	731	1	7	4.27	1.14	-0.18	4	0.57
MOTIVATIONAL FACTORS								
School Importance	732	2	5	3.88	0.61	-0.27	5	0.64
Subjective Task Value	732	1	7	5.18	1.28	-0.40	2	0.81
Meaningfulness of Classes	733	1.3	5	3.13	0.62	0.09	12	0.75
Social Goals	732	1	7	4.33	1.86	-0.19	1	
Learning Goals	732	1	7	4.33	1.45	-0.18	3	0.76
Academic Self Concept	730	1	7	5.25	1.15	-0.48	2	0.68
Academic Expectations	731	2	9	7.15	1.50	-1.01	1	
Has Fun at School	727	1	3	2.49	0.66	-0.94	1	
PERCEIVED ENVIRONMENT FACTORS								
Teachers are Unfair	731	1	5	2.59	0.91	0.30	4	0.80
Parental School Support	733	-1.9	1.6	0.00	0.73	-0.22	5	0.78
Parental School Expectations	730	-2.4	1.4	0.00	0.79	-0.29	3	0.69
Friends' School Attitudes	733	1.4	5	3.57	0.62	-0.07	9	0.77
Friends' School Behaviors	731	1.2	5	3.72	0.59	-0.47	5	0.65

[a]Whites were the excluded category in the analyses. [b]Grades based on weighted average of the numbers of each grade (e.g., 5 A's, 2 B's) that students report.

Table 2

Means (SD) of Adolescents' Substance Use in 8th and 11th Grades by Ethnicity and Gender.

	8th Grade - 30 Day Substance Use			11th Grade - 6 Month Substance Use		
	Alcohol (Range: 1-7)	Cigarettes (Range: 1-6)	Marijuana (Range: 1-7)	Alcohol (Range: 0-5)	Cigarettes (Range: 1-7)	Marijuana (Range: 0-5)
			Whites			
Males	1.87(1.5)	1.37(1.0)	1.21(0.8)	1.44(1.9)	1.89(1.5)	1.06(1.8)
Females	1.90(1.4)	1.30(0.7)	1.07(0.5)	1.23(1.6)	1.82(1.2)	0.78(1.4)
			African Americans			
Males	1.60(1.2)	1.15(0.7)	1.17(0.7)	0.85(1.3)	1.31(0.8)	0.73(1.5)
Females	1.52(1.1)	1.08(0.4)	1.05(0.4)	0.60(1.0)	1.23(0.7)	0.34(1.0)
			Biracial/Other Ethnic Minority Students			
Males	1.86(1.5)	1.32(1.2)	1.19(0.7)	0.86(1.3)	1.69(1.3)	0.79(1.4)
Females	1.57(1.1)	1.17(0.5)	1.09(0.5)	0.83(1.1)	1.47(0.9)	0.60(1.4)

Table 3 Correlations of All Variables among the Total Sample (largest n in matrix = 733, smallest n = 618).

Total Sample	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1 African American																												
2 Other Minority	**-.41**																											
3 Female	-.04	.07																										
4 Socio-Economic Status	**-.18**	.06	-.03																									
5 Alcohol Use (8th Grade)	**-.09**	.00	-.02	-.05																								
6 Cigarette Use (8th Grade)	-.01	.00	**-.10**	-.01	**.45**																							
7 Marijuana Use (8th Grade)	**-.12**	.01	-.05	-.02	**.49**	**.59**																						
8 Alcohol Use (11th Grade)	**-.18**	-.02	**-.07**	.02	**.28**	**.10**	**.19**																					
9 Cigarette Use (11th Grade)	**-.24**	.03	-.04	-.02	**.31**	**.12**	**.27**	**.51**																				
10 Marijuana Use (11th Gr)	**-.12**	.01	**-.11**	-.02	**.20**	.06	**.12**	**.68**	**.49**																			
11 Grades (8th Grade)	**-.33**	**.10**	**.22**	**.28**	**-.08**	-.05	-.07	-.03	**-.10**	**-.09**																		
12 School Misbehavior	.05	-.04	**-.16**	**-.08**	**.43**	**.30**	**.38**	**.26**	**.22**	**.25**	**-.27**																	
13 Depression	.03	-.01	.06	-.05	**.17**	.07	**.12**	**.09**	**.13**	**.11**	**-.14**	**.17**																
14 Self Esteem	**.08**	.00	**-.14**	.04	**-.11**	-.05	**-.15**	-.06	-.06	-.03	**.09**	**-.10**	**-.55**															
15 Own Popularity	**.25**	.02	-.05	**-.10**	-.03	-.04	**-.08**	-.01	**-.09**	.00	**-.11**	.06	**-.30**	**.34**														
16 Importance of Popularity	.07	-.03	**-.25**	.00	.04	.00	.03	**.11**	.05	**.10**	**-.10**	**.12**	.05	-.02	**.26**													
17 School Importance	**.09**	.02	**.17**	-.01	**-.17**	**-.12**	**-.21**	**-.21**	**-.18**	**-.21**	**.15**	**-.24**	**-.27**	**.17**	**.10**	**-.11**												
18 Subjective Task Value	**.14**	-.01	-.01	-.05	**-.14**	-.02	**-.15**	**-.17**	**-.17**	**-.18**	**.17**	**-.16**	**-.28**	**.24**	**.25**	.07	**.44**											
19 Meaning of Classes	**.07**	.01	-.01	**-.08**	-.04	-.04	-.03	**-.08**	-.03	**-.09**	-.01	**-.15**	**-.10**	**.14**	**.15**	.06	**.35**	**.35**										
20 Social Goals	**-.19**	.02	-.05	**.18**	**.09**	-.02	**.08**	**.14**	**.09**	**.14**	**.14**	**.15**	.01	-.06	.02	**.23**	**-.13**	**-.10**	**-.11**									
21 Learning Goals	**.10**	-.02	**.10**	**-.10**	**-.15**	-.07	**-.09**	**-.14**	**-.08**	**-.13**	.02	**-.20**	**-.15**	**.12**	**.15**	.05	**.43**	**.45**	**.47**	-.07								
22 Academic Self Concept	-.01	.01	.03	.04	**-.16**	**-.11**	**-.12**	**-.11**	**-.13**	**-.09**	**.33**	**-.22**	**-.28**	**.20**	**.26**	.05	**.34**	**.56**	**.23**	.06	**.32**							
23 Academic Expectations	-.07	.03	**.15**	**.27**	**-.14**	**-.09**	**-.09**	-.04	-.04	**-.07**	**.31**	**-.11**	**-.11**	**.13**	.02	.00	**.15**	**.13**	**.08**	**.09**	**.08**	**.23**						
24 Has Fun at School	.03	-.01	**.12**	.05	**-.10**	-.04	**-.12**	**-.08**	-.05	**-.08**	**.15**	**-.11**	**-.39**	**.22**	**.18**	.02	**.29**	**.24**	**.19**	.05	**.30**	**.23**	**.11**					
25 Teachers are Unfair	.07	-.06	**-.13**	.02	**.24**	**.13**	**.20**	**.11**	**.14**	**.13**	**-.19**	**.30**	**.20**	**-.15**	.06	**.21**	**-.35**	**-.17**	**-.26**	**.16**	**-.26**	**-.14**	**-.09**	**-.14**			
26 Parental School Support	**.15**	.00	-.04	**-.11**	**-.08**	-.01	-.02	**-.13**	-.05	**-.10**	**-.08**	**-.12**	**-.10**	**.18**	**.14**	.07	**.23**	**.20**	**.37**	**-.16**	**.33**	**.10**	-.02	**.08**	**-.15**			
27 Parental Expectations	**.07**	**.09**	.01	**.13**	-.05	.00	-.02	-.03	**-.10**	-.05	**.15**	-.01	**-.10**	**.10**	**.16**	**.09**	**.20**	**.24**	**.08**	.06	**.10**	**.34**	**.27**	.05	.00	.06		
28 Friends' School Attitudes	.00	.01	**.19**	-.03	**-.23**	**-.15**	**-.16**	**-.23**	**-.18**	**-.22**	**.11**	**-.32**	**-.24**	**.19**	.06	**-.16**	**.47**	**.33**	**.29**	**-.21**	**.42**	**.17**	**.12**	**.24**	**-.42**	**.33**	.02	
29 Friends' School Behavior	-.05	.00	**.20**	**.12**	**.25**	**.10**	**.14**	**.23**	**.19**	**-.23**	**.23**	**.35**	**-.19**	**.10**	.01	**-.12**	**.39**	**.29**	**.21**	-.06	**.34**	**.23**	**.24**	**.23**	**-.30**	**.25**	**.08**	**.65**

Table 4 Univariate[a] and Multivariate[b] Predicted Odds Ratios for Being in High, Moderate, or No Substance Use Groups in 11th Grade.

8th Grade Predictor Variables	High Substance Use vs. Moderate Substance Use		Moderate Substance Use vs. No Substance Use		High Substance Use vs. No Substance Use	
	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
DEMOGRAPHICS						
African American[c]	0.35***	0.28***	0.79	0.68	0.28***	0.22***
Other Minority[c]	0.52#	0.44#	1.25	1.16	0.65	0.50
Female	0.70	0.90	1.08	1.47#	0.75	1.35
Socio-Economic Status	1.01	1.06	1.00	1.01	1.02	1.03
PSYCHOSOCIAL FACTORS						
Self Reported Grades	0.83#	0.84	0.96	0.99	0.80*	0.89
School Misbehavior	1.64***	1.54**	1.27*	1.15	1.94***	1.65***
Depression	1.37**	1.31#	1.12	1.06	1.52***	1.37*
Self Esteem	0.79*	0.96	1.00	1.13	0.78*	1.16
Perception of Own Popularity	0.78*	0.90	1.06	1.09	0.82*	0.95
Importance of Being Popular	1.28*	1.25	1.08	1.05	1.34**	1.35*
MOTIVATIONAL FACTORS						
School Importance	0.62***	0.83	0.82*	0.94	0.53***	0.85
Subjective Task Value	0.62***	0.67*	0.96	1.32*	0.59***	0.97
Meaningfulness of Classes	0.86	1.09	0.91	1.04	0.79*	1.06
Social Goals for Going to School	1.29*	1.08	1.17#	1.16	1.51***	1.14
Learning Goals	0.79*	1.18	0.84#	0.88	0.69***	0.98
Academic Self Concept	0.75**	1.19	0.93	0.92	0.69***	1.02
Academic Expectations	0.87	0.89	0.95	0.88	0.82*	0.87
Has Fun at School	0.88	1.12	0.86#	0.86	0.75**	1.05
PERCEIVED ENVIRONMENT						
Teachers are Unfair	1.38**	0.90	1.10	0.94	1.39***	0.88
Parental School Support	0.85	1.05	0.85#	0.93	0.73**	1.11
Parental School Expectations	0.84	1.11	1.05	1.02	0.88	1.06
Friends' School Attitudes	0.65***	0.95	0.74***	0.86	0.46***	0.75
Friends' School Behaviors	0.66***	0.79	0.72***	0.82	0.48***	0.67*

#p<.10, *p<.05, **p<.01, ***p<.001 [a]Logistic regressions were run separately for each of the predictors (see Rumberger, 1995). [b]All 8th grade predictors were entered simultaneously in the three logistic regressions. [c]Comparison group is White students.

Table 5

Univariate[a] and Multivariate[b] Predicted Odds Ratios for Being in the Different Change Groups based on Substance Use in 8th and 11th Grades.

	Initiators vs. Nonusers		Users vs. Initiators		Users vs. Nonusers	
8th Grade Predictor Variables	Univariate	Multivariate	Univariate	Multivariate	Univariate	Multivariate
DEMOGRAPHICS						
African American[c]	0.62*	0.54*	0.60*	0.48*	0.37***	0.19***
Other Minority[c]	1.30	1.10	0.48*	0.55	0.62	0.64
Female	0.87	1.30	0.91	1.04	0.79	1.34
Socio-Economic Status	0.94	0.95	1.00	1.05	0.95	1.00
PSYCHOSOCIAL FACTORS						
Self Reported Grades	0.87	0.88	0.95	1.07	0.82*	0.89
School Misbehavior	1.57***	1.46*	1.67***	1.41*	2.70***	2.08***
Depression	1.15	1.08	1.33*	1.06	1.55***	1.20
Self Esteem	1.02	1.13	0.74**	0.81	0.75**	1.03
Perception of Own Popularity	1.06	1.01	0.89	1.02	0.94	1.08
Importance of Being Popular	1.24*	1.13	1.01	0.93	1.24*	1.08
MOTIVATIONAL FACTORS						
School Importance	0.78*	0.90	0.71**	0.94	0.55***	0.76#
Subjective Task Value	0.86	1.00	0.82#	1.09	0.72***	1.19
Meaningfulness of Classes	1.00	1.15	0.80#	0.99	0.82*	1.10
Social Goals for Going to School	1.29*	1.17	1.10	0.99	1.39***	1.11
Learning Goals	0.91	1.02	0.78*	1.13	0.71***	1.17
Academic Self Concept	0.95	1.09	0.81#	0.87	0.78**	0.94
Academic Expectations	0.92	0.94	0.83#	0.95	0.78**	0.84
Has Fun at School	0.81#	0.86	0.90	1.09	0.74**	1.01
PERCEIVED ENVIRONMENT						
Teachers are Unfair	1.07	0.87	1.67***	1.35#	1.61***	1.18
Parental School Support	0.95	1.08	0.81#	0.99	0.78**	1.12
Parental School Expectations	1.05	1.04	0.83#	1.02	0.91	1.13
Friends' School Attitudes	0.75**	0.91	0.61***	0.88	0.43***	0.72#
Friends' School Behaviors	0.68***	0.79	0.60***	0.75#	0.43***	0.61**

#p<.10, *p<.05, **p<.01, ***p<.001 [a]Logistic regressions were run separately for each of the predictors (see Rumberger, 1995). [b]All 8th grade predictors were entered simultaneously in the three logistic regressions. [c]Comparison group is White students.

Table 6 Means on the Clustering Variables and Substance Use for Different Clusters of Students who Report Substance Use at Both 8th and 11th Grades.

	Cluster					
	High Grades/ High Risk (N = 36)	Low Grades/ Low Risk (N = 38)	School Misbehavior (N = 30)	Depressed (N = 37)	High Grades/ Social Goals (N = 59)	F-Values
Clustering Variable						
Self-Reported Grades	0.42 [a]	-0.59 [b]	-1.07 [c]	-0.46 [b]	0.70 [a]	F(4,197)=45.25, p<.001
School Misbehavior	0.74 [b]	0.22 [c]	2.12 [a]	-0.05 [c,d]	-0.23 [d]	F(4,197)=49.63, p<.001
Depression	0.03 [b]	-0.26 [b]	0.04 [b]	1.65 [a]	-0.20 [b]	F(4,199)=43.36, p<.001
School Importance	-0.96 [c]	0.56 [a]	-0.87 [c]	-0.92 [c]	-0.13 [b]	F(4,198)=32.98, p<.001
Social Goals	1.00 [a]	-0.69 [c]	0.32 [b]	-0.42 [c]	0.55 [b]	F(4,198)=30.30, p<.001
Friends' School Behaviors	-0.94 [c]	-0.17 [b]	-1.28 [c]	-0.93 [c]	0.43 [a]	F(4,198)=28.58, p<.001
8th Grade Substance Use						
Alcohol	2.97 [a,b]	2.81 [b]	3.62 [a]	2.86 [a,b]	2.34 [b]	F(4,196)=3.18, p<.05
Cigarettes	1.74 [b]	1.23 [c]	2.20 [a]	1.51 [b,c]	1.22 [c]	F(4,195)=6.03, p<.001
Marijuana	1.26 [b]	1.44 [b]	1.97 [a]	1.22 [b]	1.10 [b]	F(4,192)=4.17, p<.01
11th Grade Substance Use						
Alcohol	2.42 [a]	1.58 [b]	2.53 [a]	2.16 [a,b]	1.85 [a,b]	F(4,197)=2.40, p=.05
Cigarettes	2.42 [a,b]	1.92 [b]	2.63 [a]	2.14 [a,b]	1.81 [b]	F(4,198)=2.50, p<.05
Marijuana	1.75 [a,b]	1.29 [b]	2.30 [a]	1.73 [a,b]	1.19 [b]	F(4,199)=2.18, p=.07

Note. Cluster variable means are expressed as *z* scores and substance use means are in the original metric (see Table 1). Posthoc Duncan comparisons were used to test differences among cluster groups. If groups share a superscript, they are NOT significantly different on the clustering variable at the $p < .05$ level.

Figure 1 Eighth Grade Profiles of Students in the No Substance Use, Moderate Substance Use, and High Substance Use Groups in 11th Grade.

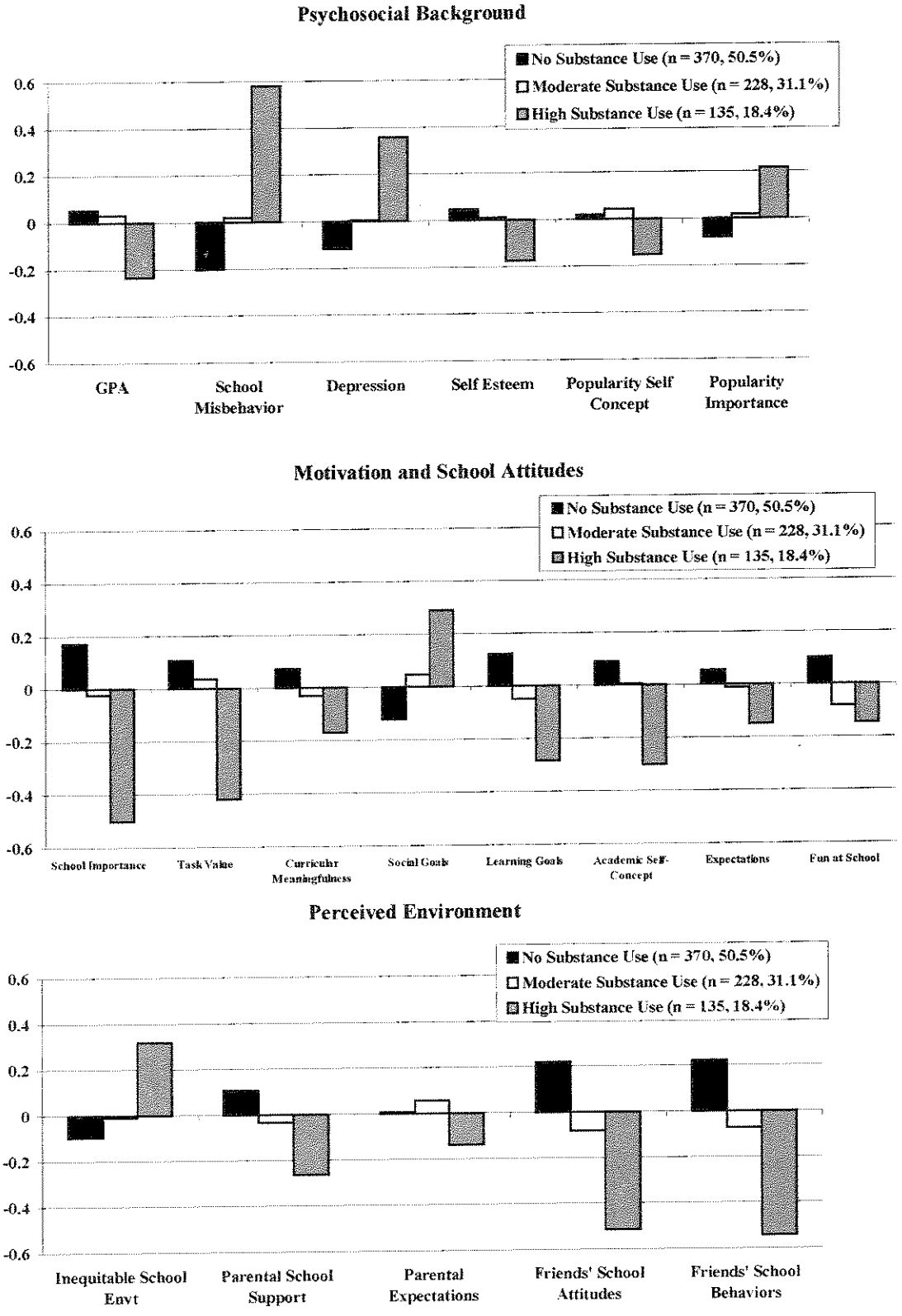

Figure 2 Eighth Grade Profiles of Students in the Nonusers, Initiators, Desistors, and Users Groups Based on Substance Use in 8th and 11th Grades.

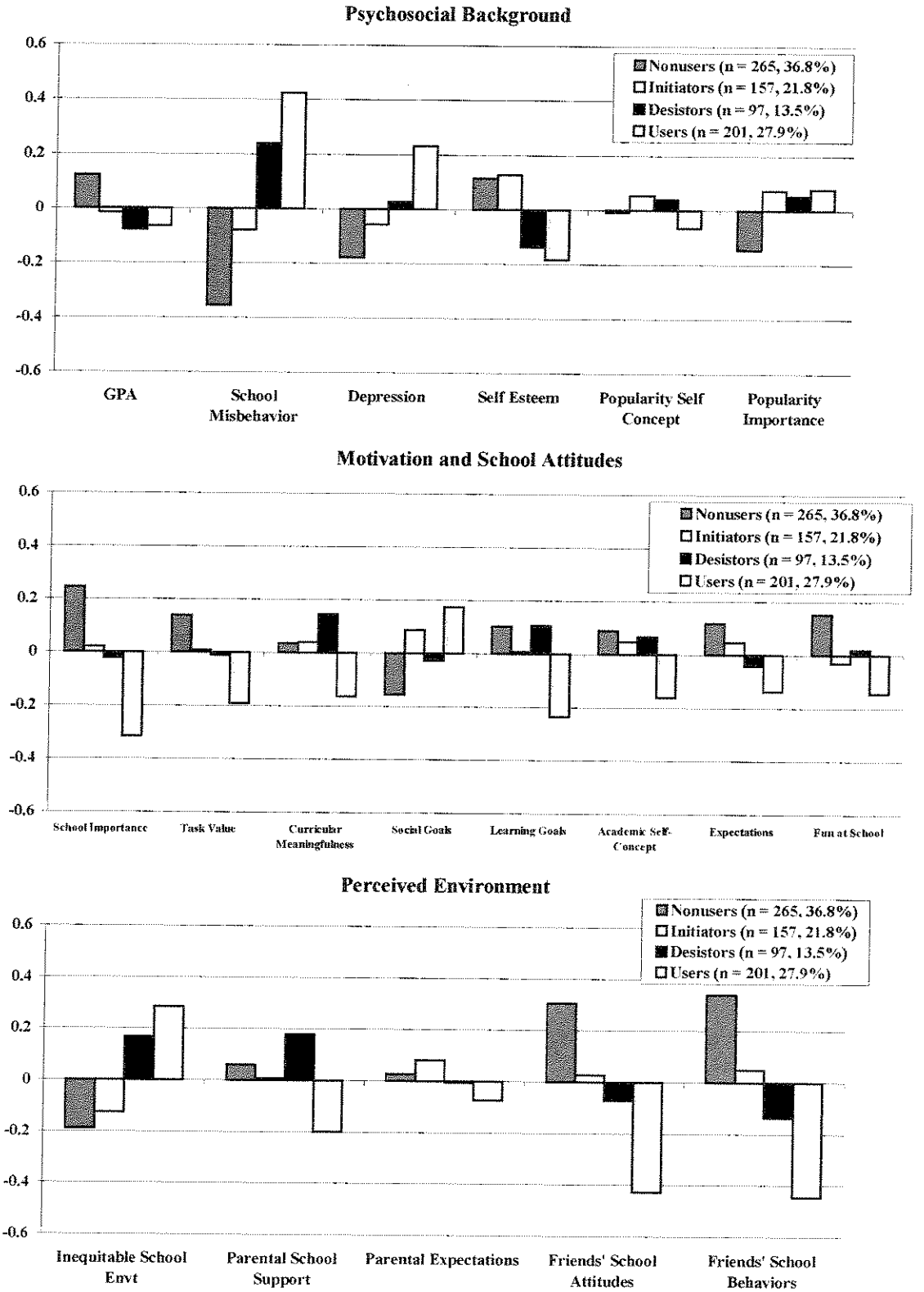

Figure 3

Eighth Grade Profiles of Clusters of "Users"—Youth Who Report Substance Use at Both 8th and 11th Grades.

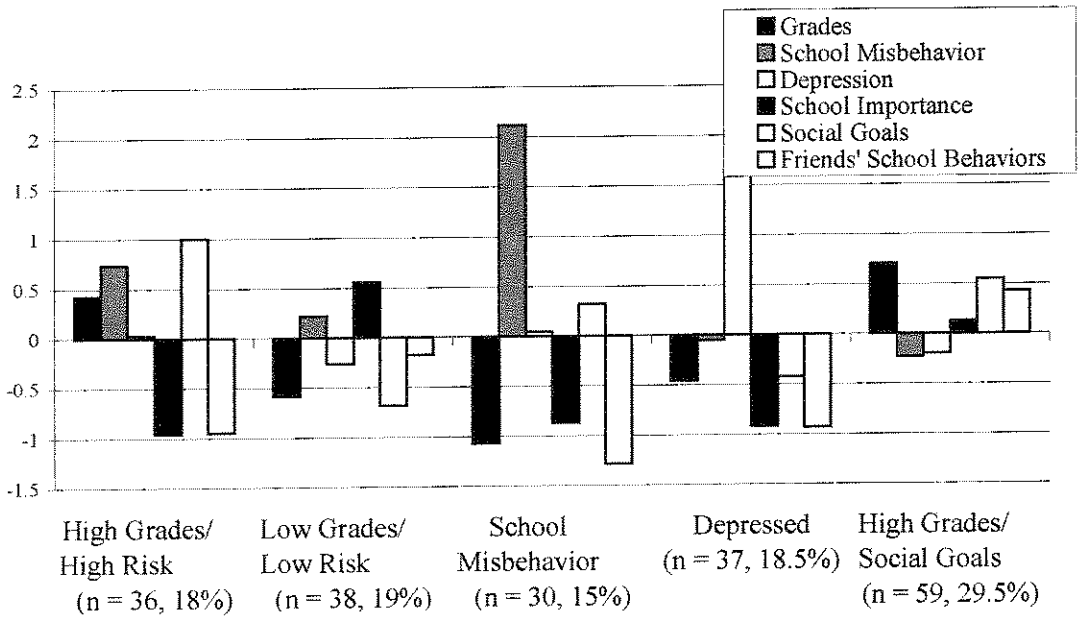

Figure 4

Eighth Grade Profiles of Clusters of "Nonusers"—Youth Who Report No Substance Use at 8th and 11th Grades.