Published in final edited form as:

J Clin Child Adolesc Psychol. 2006 February ; 35(1): 72–89. doi:10.1207/s15374424jccp3501_7.

Patterns and Correlates of Substance Use Among Affluent, Suburban High School Students

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Abstract

Despite ongoing concern about substance use during adolescence, very little is known about alcohol and drug use among teens living in affluent social settings. In this longitudinal study, cluster analysis was used to characterize patterns of substance use and change in other dimensions of psychosocial adjustment within a cohort of 292 high school students (54% girls) living in an affluent, suburban community. When compared with a cluster of students reporting minimal use, clusters reporting escalating, declining, and persistently high use consistently demonstrated relatively poorer psychosocial adjustment. Moreover, other dimensions of psychosocial adjustment remained relatively stable despite changes in substance use, and there were relations involving substance use and other aspects of psychosocial adjustment that may be specific to this social setting. The findings highlight the need for preventive intervention grounded in a clear understanding of developmental process occurring within populations of affluent, suburban teens.

Despite acknowledgment of the critical role social ecology plays in determining developmental outcomes for children (for discussions, see Boyce et al., 1998; Cicchetti & Aber, 1998), very little is known about developmental psychopathology occurring in the context of socioeconomic advantage. With very few exceptions, developmentally oriented researchers assume that, when compared with children living in more difficult circumstances, children living in affluent environments enjoy social and economic advantages that decrease risk for psychosocial problems. Although research clearly indicates that poverty represents risk for poor developmental outcomes (for reviews, see Duncan & Brooks-Gunn, 1997; Luthar, 1999), some problematic outcomes, like substance use, may occur as frequently, if not more so, among children living in affluent, suburban communities. Moreover, even if emotional and behavioral difficulty do not occur more frequently among affluent teens, the causes, course, and consequences of specific problems may vary with socioeconomic context (for discussions, see Luthar, 2003; Luthar & Latendresse, 2002; Shine, 1992).

Substance Use During Adolescence in Affluent, Suburban Settings

When examined as a risk factor at the level of the individual, socioeconomic status of family does not typically emerge as a significant predictor of adolescent substance use (e.g., see Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003). However, when they have examined patterns of substance use at the school or community level, researchers have often

found more use among teens living in affluent, suburban settings when they are compared with teens living in less affluent, rural or urban settings (Ennett, Flewelling, Lindrooth, & Norton, 1997; Falck, Siegal, Wang, & Carlson, 1999; Lucas & Gilham, 1995; Skager & Fisher, 1989). In one of the few direct comparisons of two high schools selected to represent opposite ends of the socioeconomic continuum, Luthar and D'Avanzo (1999) found that, after allowance for individual differences in emotional-behavioral disturbance, a cohort of largely European American 10th-grade students living in an affluent, suburban community reported more substance use than a cohort of largely ethnic minority students living in an economically disadvantaged, urban community.

Social Context, Substance Use Trajectories, and Other Aspects of Psychosocial Adjustment

Although cause for concern, it is not presently clear what elevated rates of substance use in affluent, suburban communities represent from a developmental perspective. Within American culture, there is a dramatic increase in substance use during high school that occurs broadly across social settings (Johnston, O'Malley, Bachman, & Schulenberg, 2005). However, in the context of ongoing interest in the nature of substance use trajectories that emerge during adolescence (e.g., see Chassin, Presson, Pitts, & Sherman, 2000; Schulenberg, Wadsworth, O'Malley, Bachman, & Johnston, 1996; Windle & Wiesner, 2004), very little is known about patterns of substance use occurring during middle adolescence in the context of socioeconomic advantage. Moreover, researchers have repeatedly examined the demographic correlates, developmental antecedents, and longer term consequences of different substance use trajectories, but there has been little consideration of change in other aspects of psychosocial adjustment as they occur simultaneously with change in substance use (Sher, Gotham, & Watson, 2004). As Sher et al. noted, exploration of concurrent change in other aspects of psychosocial adjustment may better clarify potential causes and consequences of specific patterns of substance use as they unfold over time in a specific context.

Individual-based analysis of substance use during middle adolescence suggests that much of the increase in substance use during this developmental period represents time-limited involvement that typically begins during early adolescence, increases dramatically during middle to late adolescence, and then resolves during early adulthood (Bachman et al., 2002; Bachman, Wadsworth, O'Malley, Johnston, & Schulenberg, 1997). Although accepted as normative, there is emerging consensus that even time-limited substance use during middle adolescence is associated with tremendous personal and social costs (for a review, see Hingson & Kenkel, 2004), and there is evidence that, for many teens, the escalation of substance use that occurs during middle adolescence represents the beginning of chronic substance use problems that persist into adulthood with even more dramatic costs (e.g., see Flory, Lynam, Milich, Leukefeld, & Clayton, 2004; Schulenberg, O'Malley, Bachman, Wadsworth, & Johnston, 1996; Windle & Wiesner, 2004). However, although substance use during middle adolescence tends to be associated with both immediate compromise of psychosocial adjustment and risk for chronic difficulty, it is not presently clear to what extent this is true for teens living in affluent, suburban communities. It is possible that even relatively frequent alcohol and drug use may, in the context of socioeconomic advantage, not be associated with persistent problems in other aspects of psychosocial adjustment because protective influences more prevalent in affluent, suburban environments somehow minimize the negative consequences of early substance use.

Social Context and the Psychosocial Correlates of Substance Use During Adolescence

Questions about the time course of substance use and other aspects of psychosocial adjustment are also important because the psychosocial correlates of alcohol and drug use may vary with social context. Consistent with this, there is accumulating evidence that substance use occurring in the context of suburban affluence seems to be more clearly associated with psychological factors, whereas substance use occurring in the context of urban poverty seems to be more clearly linked with social influences. For example, Way, Stauber, Nakkula, and London (1994) found that suburban high school students more clearly linked substance use with efforts to manage negative emotion, whereas urban high school students more frequently expressed concern about the social context of substance use. Likewise, Luthar and D'Avanzo (1999) found that, when ethnic minority 10th-grade students living in urban poverty were compared with European American 10th-grade students living in suburban affluence, substance use was more clearly linked with emotional and behavioral disturbance among the suburban youth. When considered with the existing literature on the nature of substance use during adolescence, there are five relations of interest emerging from research being done with affluent teens that were targeted for further exploration in this study.

Substance Use and Anxiety

Although the relation between substance use and anxiety has proven equivocal in research done with other populations (Armstrong & Costello, 2002), there appears to be an important and complex relation between substance use and anxiety among affluent teens. When exploring links between substance use and different dimensions of anxiety, Luthar and D'Avanzo (1999) showed that, when compared with teens living in urban poverty, there was a positive, concurrent relation between substance use and physiological distress commonly associated with anxiety among girls living in suburban affluence but no relation between substance use and either social anxiety or excessive worrying. Subsequently, Luthar and Becker (2002) found that, within an affluent, suburban middle school, there were positive relations between substance use and both social anxiety and the physiological manifestations of anxiety among girls and boys but no relation between substance use and excessive worrying.

These findings suggest that specific types of anxiety may increase vulnerability to substance use during middle adolescence, but they offer nothing about the relation between substance use and anxiety as it unfolds over time within this population. There is, however, evidence from research done with other populations of teens that suggests the persistence of certain types of anxiety within this population may contribute to the escalation of substance use (e.g., see Kaplow, Curran, Angold, & Costello, 2001), and there is evidence that persistent or escalating patterns of substance use may contribute to an exacerbation of certain types of anxiety (e.g., see Fergusson, Lynskey, & Horwood, 1996; Hansell & White, 1991; Johnson & Kaplan, 1990). As Sher et al. (2004) noted, it is also possible that substance use and specific forms of anxiety may change concurrently, and it is possible that specific anxiety symptoms may promote substance use in vulnerable teens that persists even though the anxiety symptoms do not.

Substance Use and Depression

Although the relation between substance use and depression has also proven equivocal in other populations (Armstrong & Costello, 2002), there is accumulating evidence of a relatively robust relation between substance use and depression among teens living in affluent, suburban communities. Way et al. (1994) found that depression was more clearly

associated with substance use among suburban versus inner city teens, and Rohde, Lewinsohn, and Seeley (1996) documented a positive relation between depression and substance use in a sample of relatively affluent high school students. In their comparative study, Luthar and D'Avanzo (1999) found a positive relation between substance use and depression that seemed specific to the boys in their suburban sample, and Luthar and Becker (2002) recently found a positive association among boys and girls attending an affluent, suburban middle school.

Despite this, there are open questions about the relation between depressive symptoms and substance use as they unfold over time within this population. Positive, concurrent relations between depression and substance use evident within this population suggest that persistent depressive symptoms may contribute to an escalation of substance use or depressive symptoms and substance use may escalate concurrently. The results of research done with other populations suggest that persistent and escalating patterns of substance use may contribute to an exacerbation of depressive symptoms (e.g., see Fergusson et al., 1996; Hansell & White, 1991; Johnson & Kaplan, 1990), and, although less likely, it is again possible that the onset of depressive symptoms ensnares vulnerable teens by promoting substance use that persists even though the depressive symptoms resolve (Sher et al., 2004).

Substance Use and Delinquent Behavior

Although Mason and Windle (2002) recently highlighted the relatively modest, sometimes ambiguous nature of the relation between substance use and delinquency as it unfolds during early to middle adolescence, accumulating evidence suggests that there is a robust relation between substance use and delinquency in high socioeconomic settings. Consistent with this, Luthar and D'Avanzo (1999) found that the relation between substance use and involvement in delinquent activity was more pronounced for both boys and girls living in a suburban community when they were compared with inner-city teens. Subsequently, Luthar and Becker (2002) also found a relatively strong, positive relation for boys and girls in their cross-sectional study of students enrolled in an affluent, suburban middle school. Moreover, although there are questions about the time course of substance use and delinquent behavior within this population, the evidence from research done with other populations of teens suggests that delinquent behavior may promote substance use which then contributes to further escalation of the delinquent behavior (e.g., see Fergusson et al., 1996; Hill, White, Chung, Hawkins, & Catalano, 2000; Mason & Windle, 2002).

Substance Use and Peer Acceptance

Reviews of research exploring the nature of substance use during adolescence repeatedly highlight the critical role peer relationships play in the onset and escalation of alcohol and drug use (e.g., see Petraitis, Flay, & Miller, 1995). A number of years ago, Shedler and Block (1990) documented the presence of a curvilinear relation between substance use and quality of peer relations such that high school students who abstained and those who used frequently demonstrated relatively poorer peer relations whereas those who used casually demonstrated relatively better peer relations. Contrary to this, Luthar and D'Avanzo (1999) found a positive, linear relation between substance use and peer acceptance across both urban and suburban settings that seemed to be more pronounced for boys attending the suburban high school, and Luthar and Becker (2002) noted a similar relation for boys attending middle school in an affluent, suburban community. However, although there is convincing evidence that peer relationships change as teens become more involved in substance use (for a discussion, see Bauman & Ennett, 1996), it is not clear how this happens in association with different patterns of substance use by affluent, suburban teens. Low to moderate substance use may promote peer acceptance, but persistent use may be associated with a deterioration of peer relations as affluent, substance-abusing teens become

increasingly marginalized within peer groups organized primarily around the alcohol and drug use.

Substance Use, Adaptive School Behavior, and Academic Performance

Attitudes toward school, school behavior, and academic performance have consistently been linked with differential risk for substance use during middle adolescence (e.g., see Bryant et al., 2003). Moreover, Luthar and D'Avanzo (1999) found that the relation between substance use and poor school adjustment appeared to be similar across socioeconomic settings when examined in variable-based analyses. However, individual-based analyses of potential differences suggested that, in addition to a subgroup of socially alienated students disengaged from school and involved in delinquent behavior present across socioeconomic settings, affluent, suburban high schools may also contain a group of teens with relatively high levels of substance use, minimal involvement in delinquency, motivation to do well in school, but relatively poor school performance (Luthar & Ansary, 2005). Moreover, although Bryant et al. proposed that substance use during middle adolescence has little direct effect on academic performance, Mason and Windle (2001) found that alcohol use in a relatively affluent sample of high school students was associated with deterioration of school performance. Furthermore, Hill et al. (2000) found that binge drinking during middle adolescence was associated with failure to complete high school, and Lynskey, Coffey, Degenhardt, Carlin, and Patton (2003) noted a similar relation between weekly marijuana use and failure to complete secondary school in a sample of Australian teens. Consequently, the existing data suggest that compromise of school behavior and academic performance within this population may contribute to risk for substance use and ongoing substance use may then contribute to further deterioration of both school behavior and grades.

Overview of This Study

Although this emerging literature offers some insights into the nature of developmental psychopathology in affluent, suburban settings, very little is known about the course of substance use and other dimensions of psychosocial adjustment as they unfold over time in this social ecology. Consequently, this longitudinal study was designed to examine trends in substance use within a cohort of affluent, suburban high school students. Building primarily on work done by Luthar and her colleagues (Luthar & Ansary, 2005; Luthar & Becker, 2002; Luthar & D'Avanzo, 1999), there were two specific goals for this project.

First, there was interest in using longitudinal data and cluster analysis to identify trajectories of substance use involving the three substances most commonly used during middle adolescence: (a) alcohol, (b) tobacco, and (c) marijuana. Given the results of other investigations in which individual-based analyses have been used to define distinct patterns of substance use during adolescence (e.g., see Colder, Campbell, Ruel, Richardson, & Flay, 2002; Schulenberg, Wadsworth, et al., 1996; Stice, Myers, & Brown, 1998; Wills, McNamara, Vaccaro, & Hirky, 1996; Windle & Wiesner, 2004; Zapert, Snow, & Tebes, 2002), a relatively large cluster of students with minimal to no use was expected to emerge. When compared with this cluster, three groups representing (a) late escalating use, (b) early escalating use, and (c) persistently high use were expected to emerge, and although not consistently noted in the existing literature (e.g., see Flory et al., 2004; Wills et al., 1996; Zapert et al., 2002, vs. Chassin et al., 2000; Colder et al., 2002; Stice et al., 1998; Windle & Wiesner, 2004), a subgroup characterized by declining use was also expected to emerge.

Second, once common substance use trajectories were defined, there was interest, as suggested by Sher et al. (2004), in using growth curve analyses to identify change in other aspects of psychosocial adjustment associated with specific patterns of substance use as they unfold over time. Specifically, there was interest in examining relations involving different

patterns of substance use and nine constructs representing six aspects of psychosocial adjustment: (a) severity of depression, (b) different dimensions of anxiety, (c) involvement in delinquent activity, (d) degree of peer acceptance, (e) different dimensions of adaptive school behavior, and (f) academic performance. Assuming the five hypothesized patterns of substance use emerged from the cluster analysis, the goal was to document differences in psychosocial adjustment associated with substance use by comparing students reporting late escalating, early escalating, declining, and persistently high patterns of use with students reporting minimal to no use.

Given the literature cited earlier, specific hypotheses about patterns of psychosocial adjustment expected to occur with specific patterns of substance use were proposed. When compared with a developmental trajectory involving little to no substance use during middle adolescence, developmental trajectories representing early escalating, late escalating, and persistently high patterns of use were expected to be associated with higher, escalating patterns of (a) depression, (b) social anxiety, (c) physiological distress associated with anxiety, and (d) delinquent behavior. These three developmental trajectories were also expected to be characterized by lower, declining patterns of adaptive school behavior and academic performance. Similarly, early and late escalating patterns of use were expected to be characterized by higher, increasing patterns of peer acceptance, whereas a persistently high pattern of use was expected to be characterized by a higher, declining pattern of peer acceptance. Finally, when compared with a developmental trajectory representing little to no substance use, a developmental trajectory representing declining use was expected to be associated with higher, declining patterns of (a) depression, (b) social anxiety, (c) physiological distress associated with anxiety, and (d) delinquent behavior. This developmental trajectory was also expected to be associated with a higher, declining pattern of peer acceptance and lower, improving patterns of adaptive school behavior and academic performance.

Method

Community Setting

The sample for this study was a cohort of students attending a high school that served three affluent, suburban towns located in southern Connecticut. At the time the study was done, data reported by the U.S. Census Bureau (2002) indicated that the three towns had a total population of approximately 27,000 largely European American (92%) residents. When the national census was done in 1999, the median income per household for the three towns was \$74,898, \$79,365, and \$102,121. In contrast, the median income per household for the entire state was \$53,935. Similarly, when compared with statistics for the entire state, adults living in these communities were more likely to have earned a bachelor's degree (51% vs. 31%); more likely to work in management, business, and professional occupations (57% vs. 39%); and more likely to be living in a home they owned (91% vs. 67%) with minor children (44% vs. 24%).

School Setting

Similarly, data compiled by the Connecticut State Department of Education (2003) indicated that, across the 3 years of the study, the school had a total enrollment of 880 to 951 students attending Grades 10 through 12, and per-pupil expenditure for secondary education in the school district was approximately 20% more than the state average. Moreover, 99% of the cohort followed for this study took the Scholastic Aptitude Test versus 75% of graduates throughout the state, and the average score for this cohort was approximately 80 points higher than the average for the entire state. Ninety-three percent of the entering class

graduated, and 94.5% pursued some form of higher education. Across the state, 83.6% of the entering class completed high school, and 75% pursued some form of higher education.

Participants

The sample for this longitudinal study consisted of 289 teens who entered this high school in the fall of 1995 as 10th-grade students. Students who enrolled during 11th ($n = 16$) and 12th ($n = 6$) grade were added to the cohort. Because limited resources and ethical considerations precluded tracking of students across school districts, students who left the school during 11th ($n = 9$) and 12th ($n = 25$) grade had to be dropped from the sample. Rates of participation were 93.1%, 87.1%, and 82.7% of the students enrolled in 10th, 11th, and 12th grade, respectively, when the annual assessments were conducted. Across the 3 years, 292 of 311 students (93.8%) agreed to participate. Two hundred of the students who agreed to participate (68.5%) completed all three assessments, 64 students (21.9%) completed two assessments, and 28 students (9.6%) completed one assessment.

The average age of the students who agreed to participate was 16.14 ($SD = 0.49$) years at the time of the first data collection. Approximately 54% of the participants were girls. Most (81.9%) of the students were of European American heritage. The others were of Asian (7.2%), mixed (6.2%), Hispanic (2.8%), or African American (1.9%) heritage.

Measurement

Substance use—The substance use grid from the Monitoring the Future Survey (Johnston et al., 2005) was used to measure frequency of substance use over the course of the previous year. This self-report instrument requires that respondents rate the frequency of their substance use along a 7-point ordinal scale ranging from 0 (*never*) to 6 (*40+ times*). The reliability and validity of the instrument have been documented repeatedly in a school-based survey done annually with a nationally representative sample of junior and senior high school students (Johnston et al., 2005).

For this study, a composite variable reflecting the qualitative and quantitative dimensions of substance use was created by adding frequency ratings for (a) alcohol, (b) cigarettes, and (c) marijuana. This was done because these three substances account for most of the substance use by high school students (Johnston et al., 2005). They are also frequently used concurrently (e.g., see Wills et al., 1996; Zapert et al., 2002), they have similar developmental trajectories (e.g., see Flory et al., 2004), and they have similar psychosocial correlates (e.g., see Flory et al., 2004). Needle, Su, and Lavee (1989) showed that this approach yields a reliable, valid index of global involvement in substance use, and a number of researchers have used a similar strategy to create global measures of substance use in research done with high school students (e.g., see Wills, Sandy, Shinar, & Yaeger, 1999). Scores on this continuous composite ranged from 0 representing no use of any substances over the course of the past year to 18 representing weekly to more than weekly use of all three substances over the course of the preceding year. Across the three measurements, coefficients alpha for this composite index ranged from .81 to .85.

Anxiety—The Revised Children's Manifest Anxiety Scale (Reynolds & Richmond, 1985) was used to measure severity of anxiety. This self-report measure requires that respondents indicate whether each of 37 statements are generally *true* versus *false* for them. The 37 items yield subscale scores representing three dimensions of anxiety: (a) social anxiety, (b) worry, and (c) physiological manifestations of anxiety. The reliability and validity of the measure have been documented by Reynolds and Richmond.

In this study, only the subscales representing social anxiety and physiological manifestations of anxiety were used. Scores on these subscales can range from 0 to 7 for the measure of social anxiety and 0 to 10 for the measure of physiological distress. Higher scores represent more emotional distress. Scores greater than 5 on the measure of social anxiety and scores greater than 5 (boys) or 6 (girls) on the measure of physiological distress represent emotional distress exceeding that reported by more than 90% of high school students (Reynolds & Richmond, 1985). Across the three measurements, coefficients alpha ranged from .66 to .68 for the measure of social anxiety and .62 to .65 for the measure of physiological distress.

Depression—The Children's Depression Inventory (Kovacs, 1992) was used to measure severity of depression. This 27-item, self-report measure of depressive symptoms was designed to measure severity of specific depressive symptoms in children and adolescents over the course of the previous 2 weeks. Kovacs and others (e.g., see Craighead, Curry, & Hardi, 1995) documented the reliability and validity of the measure. Higher scores represent greater endorsement of depressive symptoms, and a score of 17 maximizes sensitivity and specificity when used to identify teens with major depressive symptomatology (Craighead et al., 1995). Coefficients alpha for the measure fell between .86 and .87 across the three measurements.

Delinquent behavior—The Self-Report of Delinquency Checklist (Elliot, Dunford, & Huizinga, 1987) was used to measure delinquent behavior. This 38-item, self-report measure requires that respondents rate how often they engaged in delinquent behavior common during early to middle adolescence over the course of the previous year using a 4-point ordinal scale that ranges from 0 (*never*) to 3 (*very often*). Items are averaged to create a total score reflecting severity of delinquent behavior over the course of the previous year. Total scores can range from 0 representing no involvement in delinquent activity to 3 representing frequent involvement in all types of delinquent activity. The reliability and validity of the instrument have been documented by several researchers (e.g., see Huizinga & Elliot, 1986), and the instrument has been used extensively in large-scale surveys of adolescents (e.g., see Loeber et al., 2001). In this study, six items representing delinquent behavior directly related to substance use were not included in computation of the total score to avoid spurious correlation with the measure of substance use. Coefficients alpha for this measure fell between .89 and .91 across the three measurements.

Peer acceptance—The sociometric procedure developed by Coie, Dodge, and Coppotelli (1982) was used to document quality of peer relations. This procedure involves asking teens to list the students in their class whom they like the most and those whom they like the least. The reliability and validity of the method have been documented repeatedly (e.g., see Coie & Dodge, 1983; Coie et al., 1982), and the procedure has been used extensively with junior and senior high school students (e.g., see Matza, Kupersmidt, & Glenn, 2001). In this study, students were asked to nominate three classmates of either gender whom they liked and three whom they did not like. The total number of positive nominations was taken as a continuous measure of peer acceptance.

Adaptive school behavior—The Teacher-Child Rating Scale (Hightower et al., 1986) was used to characterize the adaptive school behavior of each participant enrolled in the study. This 36-item, behavior-rating scale documents three dimensions of adaptive school behavior (assertiveness, frustration tolerance, and task orientation) and three dimensions of problematic school behavior (acting-out behavior, shy-anxious behavior, and learning problems). Teachers rate the extent to which each item characterizes the school behavior of a specific student along a 5-point ordinal scale that ranges from 0 (*not at all*) to 4 (*very well*).

for adaptive behaviors and from 0 (*not a problem*) to 4 (*very serious problem*) for problem behaviors. The score for each subscale is the mean of the six items representing that construct. Higher scores represent either more adaptive or more maladaptive school behavior. High-tower et al. documented the psychometric properties of the measure, and teacher ratings collected with the instrument have correlated meaningfully with other constructs in school-based research done with older children and adolescents (e.g., see Luthar & Becker, 2002; Luthar & D'Avanzo, 1999).

In this study, only the three adaptive behavior scales were used. At the time of the annual assessments, English teachers rated the adaptive school behavior of each student enrolled in the study. A concurrent teacher rating was available for 729 (Assertiveness), 731 (Task Orientation), and 732 (Frustration Tolerance) of the 756 self-report assessments completed by the 292 students. Across the three assessments, coefficients alpha for the three scales ranged from .88 to .92 for the measure of assertiveness, .75 to .88 for the measure of frustration tolerance, and .95 to .96 for the measure of task orientation.

Academic performance—A weighted grade point average was used to document the academic performance of each student during the same semester the other data were collected. This grade point average was computed using grades in four courses representing the traditional academic domains of (a) English, (b) mathematics, (c) science, and (d) social studies. Grades were weighted using a quality point system developed by the school district to account for differences in difficulty across the five academic tracks within the school. Each grade in these core academic subjects was assigned a quality point value of 0 to 20, and these four weighted grades were averaged to produce a grade point average for the semester. This quality point average had a range of 0 to 20 such that higher values represented better grades in more difficult courses. Across the 3 school years, coefficients alpha for this index fell between .91 and .93.

Procedure

This study was completed over the course of 3 successive school years. The first assessment was completed as the cohort completed the spring semester of 10th grade. All students attending school as member of this cohort were invited to participate. Informed consent was secured in writing from a legal guardian of each child via mail. Informed assent was also obtained in writing from students before data collection began. The research protocol was approved by the principal of the school, the local board of education, and the institutional review board for the Yale University School of Medicine.

Across school years, data were collected in a similar manner. During the 1st and 3rd years, data were collected during two class periods. During the 2nd year, data were collected during a single class period. Students interested in participating who were absent at the time of the primary data collections were located afterward. During all assessments, questionnaires were read aloud by a research assistant while students read along silently and independently marked their response. Students were offered \$3.00 compensation for time spent completing the first two assessments and \$5.00 compensation for time spent completing the last assessment. Likewise, teachers were offered \$1.00 compensation for each teacher-rating scale they completed during the first two data collections and \$3.00 compensation for each teacher-rating scale they completed during the last data collection.

Results

Preliminary Growth Curve Analyses

In a series of preliminary analyses, unconditional growth curve analyses were done to test for statistically significant change in substance use and the other nine dimensions of psychosocial adjustment within the full sample. This series of analyses was done with the PROC MIXED algorithm available in SAS (SAS Institute, 1999). Time was coded so that the intercept represented status at the end of 10th grade when the first assessment was completed. Initial status (intercept) and the growth rate (slope) were designated as both fixed and random effects. The restricted maximum likelihood method of estimation was used with specification of an unstructured variance–covariance matrix. Wald z statistics were used to test the statistical significance of covariance parameters, and approximations of the t statistic were used to test the statistical significance of parameter estimates representing fixed effects. All statistics with p values less than .10 were considered of interest.

The results of these unconditional growth curve analyses are presented in Table 1. As indicated, estimates of random effects reflected significant variability in initial status (intercept) for both substance use and the other nine dimensions of psychosocial adjustment, and there was significant variability in the growth rate (slope) for both substance use and all other dimensions except peer acceptance and assertiveness. There was also significant, negative covariance of initial status and the growth rate for depression, delinquent behavior, frustration tolerance, and task orientation and significant, positive covariance of initial status and the growth rate for social anxiety and physiological manifestations of anxiety.

Analysis of fixed effects indicated that, as a cohort, these high school students presented with limited substance use at the end of 10th grade that increased significantly over time. There was also evidence of limited social anxiety, limited physiological distress associated with anxiety, and limited depression at the end of 10th grade. Social anxiety declined significantly over time, but there was no significant change in physiological distress or depression. Low levels of delinquent behavior and moderate levels of peer acceptance at the end of 10th grade also declined significantly during the next 24 months. Moderate levels of assertiveness at the end of 10th grade increased significantly, but there was no evidence of any significant change in moderate levels of frustration tolerance or task orientation. Academic performance also did not change significantly over time.

Cluster Analysis

In a second series of statistical analyses, k -means cluster analysis was used to identify common patterns of substance use over time. Substance use composites for 10th, 11th, and 12th grade were entered into the PROC FASTCLUS algorithm available in SAS (SAS Institute, 1999) as the clustering variables. A k -means approach was chosen because, unlike hierarchical clustering procedures, k -means clustering procedures use all available data to sort each observation into the most appropriate cluster. Limited sample size precluded split-half replication of the cluster solution. Consequently, all 292 students with data available for at least one time point were entered into a single analysis with a request for five clusters. Solutions with four and six clusters were also requested as potential alternatives. Given that there are not definitive criteria for determining the optimal k -means solution, descriptive statistics reflecting (a) the size of the clusters, (b) patterns of substance use within each cluster, (c) separation of the clusters, and (d) homogeneity of the clusters were considered when determining the most appropriate solution.

Comparative evaluation of solutions defining four to six clusters indicated that, as hypothesized, the five-cluster solution offered the best representation of the data. The pattern of substance use within each cluster is presented graphically in Figure 1. As

indicated, there was a large cluster (Minimal Use) of students defined by minimal use across time. When compared with this group, Cluster 2 (Late Escalating Use) was defined by low initial use that escalated over time, particularly during 12th grade, and Cluster 3 (Early Escalating Use) was defined by moderate initial use that escalated over time, particularly during 11th grade. Cluster 4 (Declining Use) was defined by high initial use that declined over time, and Cluster 5 (Persistently High Use) was defined by high initial use that persisted over time. Clusters 1 through 5 accounted for 36.3%, 20.5%, 13.4%, 9.6%, and 20.2% of the cohort, respectively.

When considered as alternatives, the four- and six-cluster solutions did not provide a better representation of the data. When compared with the four-cluster solution, the five-cluster solution better represented the data when examined from both an empirical and a conceptual perspective. Conceptually, the four-cluster solution included similar representation of clusters characterized by minimal, late escalating, and persistently high use, but the solution obscured two important patterns of change present within the five-cluster solution by collapsing clusters characterized by declining and early escalating use into a single cluster characterized by persistently moderate use. Similarly, when compared with the five-cluster solution, the six-cluster solution did not represent the data markedly better when examined from either an empirical or a conceptual perspective. In the six-cluster solution, clusters representing minimal, late escalating, and persistently high use were again similar, but the cluster characterized by declining use became both notably smaller and more diffuse. The six-cluster solution also included two clusters characterized by parallel patterns of early escalating use that did not differ conceptually from the single cluster characterized by early escalating use in the five-cluster solution.

Demographic Correlates of Cluster Membership

After the optimal number of clusters was determined, analysis of variance and a chi-square test of in-dependence were used to test for between-cluster differences in chronological age and the distribution of gender. To avoid ignoring potentially meaningful demographic differences, statistics with p values less than .10 were considered of interest. In an analysis of variance, there was no significant relation between cluster assignment and age at the time of the initial assessment, $F(4, 287) = 0.43, p = .78$. The relation between gender and cluster assignment did, however, prove significant, $\chi^2(4, N = 292) = 9.06, p = .06$. Although 54% of the cohort was female, girls were dramatically overrepresented in the cluster characterized by declining use (79%) and underrepresented in clusters characterized by late escalating (48%), early escalating (46%), and persistently high (48%) use. Conversely, although 46% of the cohort was male, boys were dramatically underrepresented in the cluster characterized by declining use (21%) and overrepresented in the clusters characterized by late escalating (52%), early escalating (54%), and persistently high (52%) use.

Between-Cluster Differences in Psychosocial Adjustment

After the optimal number of clusters was determined, a second series of growth curve analyses was also done to test for between-cluster differences in patterns of psychosocial adjustment over time. For these analyses, dummy coding of cluster membership was added to the unconditional growth curve model as a fixed effect coded to represent a series of planned, pairwise comparisons such that the clusters of teens reporting (a) late escalating, (b) early escalating, (c) declining, and (d) persistently high use were each compared with the cluster reporting minimal to no use. In this series of conditional growth curve analyses, the nine dimensions of psychosocial adjustment were examined separately as the dependent variables. These nine dimensions were used to represent the six constructs of primary interest: (a) severity of depression, (b) two dimensions of anxiety (social anxiety and

physiological distress), (c) involvement in delinquent activity, (d) peer acceptance, (e) three dimensions of adaptive school behavior (assertiveness, frustration tolerance, and task orientation), and (f) academic performance (weighted grade point average). Correlations among the nine dimensions at the end of 10th grade were low to moderate ($N = 36$, $M = .22$, $SD = .20$, $Mdn = .14$) with no evidence of redundancy in any of the bivariate relations (i.e., $r > .70$).

To balance risk for Type I versus Type II error in a primary data analysis where there were both multiple dependent variables and multiple comparisons (for a discussion, see Jaccard & Guilamo-Ramos, 2002), two Bonferroni corrections were used to hold the Type I error rate for this family of planned comparisons at no more than .20. First, a simple Bonferroni correction (i.e., $.20/9 = .02$) was used to hold the Type I error rate at no more than .02 for each of the conditional growth curve analyses. Second, the modified Bonferroni procedure developed by Holm (for a description, see Jaccard & Guilamo-Ramos, 2002) was used to hold the Type I error rate at no more than .02 for each family of planned comparisons. Consistent with the recommendations of Jaccard and Guilamo-Ramos, pairwise comparisons testing for differences in initial status (intercept) were conducted independent of pairwise comparisons testing for differences in the growth rate (slope).

As indicated in Table 2, Cluster 1 (Minimal Use) was characterized by low levels of (a) depression, (b) anxiety, and (c) delinquent behavior during 10th grade that did not change significantly over time. During 10th grade, this cluster was also characterized by moderate to high levels of (a) assertiveness, (b) frustration tolerance, (c) task orientation, and (d) academic performance but low levels of peer acceptance. These markers of social competence also did not change significantly over time.

When Cluster 2 (Late Escalating Use) was compared with Cluster 1 (Minimal Use), the students in Cluster 2 demonstrated significantly greater involvement in delinquent behavior and significantly poorer academic performance at the end of 10th grade. There were, however, no significant differences in the growth rates for these two clusters. Similarly, when Cluster 3 (Early Escalating Use) was compared with Cluster 1 (Minimal Use), the students in Cluster 3 demonstrated (a) significantly more physiological distress, (b) significantly greater involvement in delinquent activity, and (c) significantly poorer academic performance at the end of 10th grade. There were, however, again no significant differences in the growth rates for these two clusters.

Next, when Cluster 4 (Declining Use) was compared with Cluster 1 (Minimal Use), the students in Cluster 4 demonstrated (a) significantly more physiological distress, (b) significantly greater involvement in delinquent activity, (c) significantly less task orientation in school, and (d) significantly poorer academic performance at the end of 10th grade. Although there was no significant change in the reference group, there was a significant *decline* in delinquent behavior over time within this cluster that proved consistent with the decline in substance use. There were, however, no other significant differences in the growth rates for these two clusters.

Finally, when Cluster 5 (Persistently High Use) was compared with Cluster 1 (Minimal Use), the students in Cluster 5 demonstrated (a) significantly more physiological distress, (b) significantly more depression, and (c) significantly greater involvement in delinquent activity at the end of 10th grade. As a group, this cluster also demonstrated (a) significantly less task orientation in school, (b) significantly poorer academic performance, and (c) significantly *more* peer acceptance at the end of the year. Surprisingly, in contrast to the reference group, in which there was no significant change over time, there was also a

significant *decline* in delinquent behavior within this cluster. Again, there were no other significant differences in the growth rates for these two clusters.

Supplementary Analyses

Because there were potentially meaningful relations involving gender and cluster assignment and preliminary analyses revealed significant gender differences in seven of the nine other dimensions of psychosocial adjustment, analysis of covariance techniques were used post hoc to test for persistence of significant between-cluster differences in the other aspects of psychosocial adjustment after allowance for gender. In this series of supplementary analyses, terms representing gender differences in initial status (intercept) and the growth rate (slope) were added to the conditional growth curve model as fixed effects. After allowance for gender, all but one of the statistically significant, between-cluster differences noted in Table 2 still proved significant. With gender in the statistical model, the difference in physiological distress at the end of 10th grade was no longer statistically significant when the cluster representing declining use was compared with the cluster representing minimal use.

Discussion

As anticipated, the results of this study highlight a number of important trends in the nature of substance use among teens living in affluent, suburban settings. Within an individual-based approach to the analysis of these longitudinal data, there were five dominant patterns of substance use over time, and when teens actively using were compared to teens using minimally or not at all, more substance use was consistently associated with relatively poorer psychosocial adjustment. Differences in psychosocial adjustment associated with different patterns of substance use were also clearly evident as students completed 10th grade, but contrary to expectations, they remained relatively stable over time despite changes in substance use. Moreover, there were a number of consistent relations involving substance use, depression, anxiety, delinquency, and peer acceptance that, although noted sporadically in other populations, may be specific to this social ecology. Finally, and perhaps most important, there was a sizable cluster of popular teens with persistently high levels of substance use, higher levels of emotional-behavioral difficulty, and relatively poor school adjustment that represents a group at risk for longer term problems.

Patterns of Substance Use Over Time

As expected, the cluster analysis indicated that there were five dominant patterns of substance use occurring over time within this cohort of high school students. In general, the typology that emerged compares with those described by other researchers (e.g., see Colder et al., 2002; Schulenberg, Wadsworth, et al., 1996; Stice et al., 1998; Wills et al., 1996; Zapert et al., 2002). Consistently, other investigations done with junior and senior high school students have identified substance use trajectories characterized by (a) minimal to no use, (b) an early onset of escalating use, (c) a later onset of escalating use, and (d) a very early onset of persistently high use. Furthermore, the escalation of substance use during 10th and 11th grade within two of the clusters is notable in light of unpublished data that suggest, although use of alcohol and marijuana may be more prevalent in urban contexts during middle school, suburban-urban differences evident during high school may be accounted for by a steeper escalation of substance use during the transition to high school in suburban settings (Ungemack, Cook, & Damon, 2001).

Within this cohort, there was also a small cluster of students who entered high school using substances on a fairly regular basis and then decreased their use over time. Similar groups have not always emerged in other investigations (e.g., see Flory et al., 2004; Wills et al.,

1996; Zapert et al., 2002, vs. Chassin et al., 2000; Colder et al., 2002; Stice et al., 1998; Windle & Wiesner, 2004). As in other research (Colder et al., 2002; Schulenberg, Wadsworth, et al., 1996; Stice et al., 1998; Windle & Wiesner, 2004), the psychosocial adjustment of the group with declining use compared to that of teens with persistently high use. Unfortunately, there is little understanding of naturally occurring declines in high levels of substance use during adolescence (Stice et al., 1998). When considered with the work of Schulenberg, Wadsworth, et al., the results of this study suggest that this trajectory may be more common among girls. Results of the study done by Schulenberg, Wadsworth, and colleagues also suggest that, although patterns of negative influences may be similar when teens with declining use are compared to teens with persistently high use, it may be differences in protective influences that account for the decline in substance use during this developmental period. Because they appear to be moving through time-limited involvement in alcohol and drug use on a timetable different from that of their peers, this is a group of teens that warrants further attention in research done in this social context.

Psychosocial Adjustment and Substance Use

Within this sample of affluent, suburban teens, there were also consistent, statistically significant relations between substance use and relatively poor psychosocial adjustment. When compared with students reporting a pattern of minimal to no use throughout high school, students reporting patterns of escalating, declining, and persistently high use clearly demonstrated relative compromise of psychosocial adjustment. In general, the results are at odds with those showing that time-limited experimentation with substance use during adolescence may be a marker of positive psychosocial adjustment (e.g., see Shedler & Block, 1990). Instead, they are much more consistent with work showing that even limited substance use seems to be associated with relatively poorer emotional-behavioral adjustment (e.g., see Flory et al., 2004).

Surprisingly, the pattern of results also suggested that, for the most part, change in substance use during this developmental period occurred relatively independent of change in other aspects of psychosocial adjustment. That is, between-cluster differences in psychosocial adjustment were evident as this cohort entered high school, and they remained relatively stable over time despite changes in substance use. Within three of the clusters, substance use increased or remained notably high with no further escalation of emotional-behavioral difficulty and no further deterioration of social competence. Conversely, substance use declined within one cluster with little corresponding improvement in other aspects of psychosocial adjustment. Together, these findings suggest that, in this socioeconomic setting, substance use during middle adolescence may occur in the context of broader, relatively stable patterns of psychosocial adaptation that emerge during childhood or early adolescence. In general, the findings are consistent with other research suggesting that the onset of emotional-behavioral difficulty with related deterioration of social competence begins before the onset of substance use (e.g., see Bryant et al., 2003; Mason & Windle, 2002), and they are at odds with research indicating that substance use is associated with an immediate escalation of emotional-behavioral difficulty and immediate deterioration of social competence (Fergusson et al., 1996; Hansell & White, 1991; Hill et al., 2000; Johnson & Kaplan, 1990; Mason & Windle, 2001, 2002). When considered with the existing literature, the results suggest that, in this social setting, substance use that begins during early to middle adolescence may need to persist into early adulthood before further deterioration of psychosocial adjustment becomes evident.

Substance use and anxiety—Within this study, an individual-based approach to exploration of the relation documented an empirical link between specific dimensions of anxiety and substance use that appears to be very prominent among affluent teens.

Surprisingly, although researchers have outlined conceptual models that link social anxiety and the use of alcohol by college students (e.g., see Burke & Stephens, 1999), there was no significant relation between social anxiety and substance use within this sample.

Physiological manifestations of anxiety were, however, consistently related with more substance use. Among high school students living in affluent settings, autonomic arousal appears to be a salient correlate of substance use during middle adolescence. Unfortunately, it was not possible from the results of this study alone to document whether this correlate represents true elevation of autonomic activity or psychological sensitivity to autonomic changes that may be normative.

Conceptually, the link between physiological distress and substance use may be accounted for by an awareness of autonomic arousal associated with either social anxiety or anxious depression. This physiological distress may also represent autonomic arousal associated with stress reaction, generalized anxiety, or panic. Kaplow et al. (2001) noted that, among teens living in a rural setting, generalized anxiety during middle childhood was associated with increased risk for the initiation of alcohol use by early adolescence, whereas separation anxiety was associated with decreased risk for initiation of alcohol use. Within a sample of Canadian teens from diverse socioeconomic backgrounds, Comeau, Stewart, and Loba (2001) also noted a positive relation between the general tendency to experience anxiety and the use of alcohol, marijuana, and nicotine to manage negative affect. In a sample of German adolescents, Zimmerman et al. (2003) found that panic during adolescence was associated with the onset and persistence of alcohol use into young adulthood.

Although this relation may represent an empirical link between autonomic reactivity associated with anxiety and substance use, it is also possible that this link may be mediated by hypersensitivity to physiological changes. Consistent with this, Comeau et al. (2001) noted that psychological sensitivity to autonomic arousal commonly associated with anxiety was related to alcohol, nicotine, and marijuana use to both manage negative affect and avoid social censure by peers. Clearly, when considered with the consistency of findings from cross-sectional investigations (Luthar & Becker, 2002; Luthar & D'Avanzo, 1999), the results of this study suggest that autonomic arousal, or psychological sensitivity to autonomic arousal, increases risk for substance use by affluent teens, and the results highlight the need for careful consideration of conceptual and empirical links involving different dimensions of anxiety and substance use within this population.

Substance use and depression—When compared with the cluster of students characterized by minimal to no use throughout high school, there was a general trend toward more depression within all the other clusters, but only the cluster with persistently high use demonstrated markedly higher levels of depression that approached the threshold for clinical significance. Rohde et al. (1996) found a similar relation between clinically significant depression and problematic use of alcohol in a sample of teens with higher socioeconomic status. Similarly, when Siegel and Ehrlich (1989) examined a small sample of teens seeking substance abuse treatment, they found that, although there were no significant differences in patterns of substance use, teens coming from more affluent backgrounds demonstrated more depression than teens coming from less affluent backgrounds. Consistent with these findings, the results of this study suggest that depression may increase vulnerability to alcohol and drug use in this social setting, but persistent substance use does not contribute to an exacerbation of depressive symptoms.

Substance use and delinquent behavior—Consistent with the results of research done with adolescents living in similar social circumstances (e.g., see Mason & Windle, 2002), there was a positive, concurrent relation between substance use and involvement in delinquent activity at the end of 10th grade. However, contrary to expectations, neither an

escalating nor a persistently high pattern of substance use was associated with an escalation of delinquent behavior. Surprisingly, there was a significant *decline* in delinquency within the clusters demonstrating both declining and persistently high use. Although Mason and Windle noted significant stability in delinquent behavior during high school, Levine and Kozak (1979) found that, among affluent teens, involvement in delinquent activity seemed to rise with the onset of adolescence, peak during the transition to high school, and then decline. The absence of escalating involvement in delinquency in any subset of students is consistent with that general trend, and the finding may represent a pattern specific to this population.

Substance use and peer acceptance—Within this sample, peer acceptance also distinguished students with minimal to no use throughout high school from those with persistently high use. This finding is at odds with the work of Shedler and Block (1990) who found that, when compared with teens who experimented with substances, students who abstained and students who used regularly demonstrated poorer peer relations. Although there was a general trend such that the students reporting minimal to no use demonstrated the lowest level of peer acceptance, students with persistently high use demonstrated the *highest* level of peer acceptance, particularly early in high school. Furthermore, in the context of a general decline in peer acceptance within the cohort, there was, contrary to expectations, no evidence that substance use was associated with a dramatic decline in social status.

Given the results of other research documenting significant clustering of teens who use alcohol and drugs (for a discussion, see Bauman & Ennett, 1996), these findings suggest that emotionally distressed, acting-out teens actively using in suburban settings may demonstrate greater peer acceptance because they represent nuclear members of cliques organized around regular substance use. As suggested by Odgers, Houghton, and Douglas (1996), this subset of teens may use substances to enhance nonconforming reputations in ways that increase their social status with peers, particularly during the transition from early to middle adolescence. Previous research has shown that antisocial behavior is often associated with peer acceptance among ethnic minority teens living in urban poverty (e.g., see Luthar & D'Avanzo, 1999; Luthar & McMahon, 1996), but the results of this study and others (Luthar & Becker, 2002; Luthar & D'Avanzo, 1999) establish empirical links between substance use and peer acceptance at the opposite end of the socioeconomic continuum.

Substance use, adaptive school behavior, and academic performance—Within this cohort, there were clear, consistent relations involving substance use and compromise of both adaptive school behavior and academic performance. From the perspective of classroom teachers, the two clusters of students with the most involvement demonstrated significantly poorer task orientation when compared with the cluster representing minimal to no use. Escalating, declining, and persistently high patterns of use were also consistently associated with relatively poorer academic performance. However, contrary to expectations, there was no evidence that substance use was associated with any notable change in either school behavior or academic performance. This position is at odds with the results of prospective research suggesting that substance use is associated with compromise of academic performance (Hill et al., 2000; Mason & Windle, 2001) and consistent with the position that deterioration of school behavior and academic performance typically occurs before the escalation of substance use (e.g., see Bryant et al., 2003). Again, when considered with the existing literature, the results suggest that, in this social setting, substance use during middle adolescence may need to persist beyond graduation from high school before further deterioration of academic performance and failure to meet educational aspirations begin to emerge.

Affluence, Substance Use, and Compromise of Psychosocial Adjustment

The results of this individual-based analysis also suggested that, despite whatever social and economic advantages might be available to teens living in this affluent, suburban environment, there was a group representing approximately 20% of the general student population with persistently high substance use and relatively poor psychosocial adjustment. Although longitudinal data suggest that some of this difficulty may be specific to adolescence (e.g., see Bachman et al., 2002; Bachman et al., 1997), the same data suggest that at least some members of this group are at risk to develop more serious substance use problems with further compromise of their psychosocial adjustment as they negotiate the developmental transition that comes with graduation from high school. Moreover, the combination of emotional distress, delinquent behavior, poor academic performance, and acceptance by peers highlights the failure of relatively simple theoretical perspectives like the self-medication hypothesis and problem behavior theory to adequately characterize developmental process associated with risk for substance use in this context (for a discussion, see Petraitis et al., 1995). Consistent with the position taken by Petraitis et al., the findings suggest that several, seemingly competing, conceptual models need to be integrated into more sophisticated positions that highlight ways socioeconomic context affects family, peer, and psychological influences to put affluent high school students on pathways to chronic substance abuse as they make the transition from adolescence to early adulthood.

Limitations

Although these results support a number of interesting conclusions about the nature of substance use among teens living in an affluent, suburban community, there are a number of limitations that also merit discussion. First, and perhaps most important, the research design used in this study confounded relations involving substance use, socioeconomic context, ethnicity, and school culture. Although evidence accumulating across investigations suggests that the results of this study may be associated with socioeconomic status (Luthar & Becker, 2002; Luthar & D'Avanzo, 1999), they may also reflect potential influences associated with ethnicity or school culture. Other research indicates that high school students of European American heritage consistently demonstrate more substance use than students of ethnic minority heritage (e.g., see Johnston et al., 2005), and there is evidence that the psychosocial correlates of substance use may vary with ethnicity (e.g., see Griffin, Scheier, Botvin, & Diaz, 2000). Other research shows that patterns of substance use also vary significantly from school to school independent of socioeconomic influences within the broader community (Ennett et al., 1997). Consequently, as Cicchetti and Aber (1998) suggested, there is clear need for additional research that will allow for the potential influence of nested contextual influences like socioeconomic characteristics of the community, school culture, and ethnicity to be better isolated.

Second, although the results of this study call attention to a hidden population of teens at risk for poor developmental outcomes, the research design did not allow for further delineation of developmental process that might be contributing to risk for emotional-behavioral difficulty in this social setting. For a number of years, researchers have suggested that (a) pressure to achieve, (b) alienation from parents, (c) lack of parental monitoring, and (d) access to financial resources may contribute to emotional-behavioral disturbance and substance use in this social context (for discussions, see Luthar, 2003; Luthar & Latendresse, 2002; Shine, 1992). In an initial study of risk for substance use among students attending an affluent, suburban middle school, Luthar and Becker (2002) documented empirical links between emotional distress and substance use that were related to both pressure to excel and sense of isolation from parents. The National Center on Addiction and Substance Abuse (2003) recently noted that disposable income may be an important

correlate of substance use during adolescence. As research with this population continues, developmental influences that may be operative at community, school, family, and individual levels of social organization need to be better articulated, creatively measured, and consistently documented within multilevel statistical models of psychosocial development (Boyce et al., 1998; Cicchetti & Aber, 1998).

Next, limited statistical power associated with the relatively small sample and the conservative approach to definition of statistical significance in the primary data analysis may have obscured some potentially meaningful trends in psychosocial adjustment. For example, although previous research suggests that there may be important gender differences in the correlates of substance use in this social context (Luthar & Becker, 2002; Luthar & D'Avanzo, 1999; Mason & Windle, 2002; Way et al., 1994), the sample was not large enough to support statistical testing for gender differences in the psychosocial correlates of cluster membership. Similarly, there were also some potentially meaningful differences in growth rates for specific constructs that may have been better characterized in a larger sample followed forward from the point they entered middle school. For example, although the difference did not prove statistically significant, there was a decline in peer acceptance within the cluster of students with persistently high substance use that may reflect meaningful change in the popularity of these students over time. Likewise, the group of students with declining substance use did present with some evidence of (a) declining emotional distress, (b) improving school behavior, and (c) improving academic performance that may reflect small but potentially meaningful improvements in psychosocial adjustment associated with the change in substance use.

Limited sample size also precluded comparison of the four clusters representing active substance use with one another. Although the focus here was on documenting ways teens with different patterns of active use differed from teens with minimal to no use, there are equally important questions about ways teens with patterns of active use differ from one another (e.g., see Schulenberg, Wadsworth, et al., 1996). Limited sample size also precluded examination of unique relations between cluster membership and the other dimensions of psychosocial adjustment after allowance for the low to moderate correlation of the different dimensions with one another. Furthermore, although the focus here was on socioeconomic status as a contextual influence, it is important to acknowledge that relative affluence within this culture may also be an important influence at the level of the individual. That is, teens whose families are more or less affluent may be more or less vulnerable to developmental process that promotes substance use in this context. Finally, students who left high school before graduating and transient students known to present with emotional-behavioral difficulty could not be retained in this study. Consequently, the results may actually underestimate both the severity of the problems and the strength of the empirical relations (for a discussion, see Johnston et al., 2005).

Conclusion

Although poverty clearly represents a threat to positive child development, socioeconomic advantage does not necessarily offer immunity from emotional and behavioral difficulty that often emerges with the onset of adolescence. Despite the protective influences associated with high socioeconomic status, there are clusters of teens living in affluent, suburban settings who present with patterns of substance use that represent immediate and long-term risk for compromise of psychosocial adjustment. As researchers begin to acknowledge the broad influence of social context on developmental outcomes, there is clear need to better understand developmental pathways through adolescence that occur within the culture of suburban affluence so that preventive interventions can be designed to target risk for poor developmental outcomes within this hidden population of teens.

Acknowledgments

This research was supported by Grants K21 DA00202, P50 DA09241, R01 DA10726, and R01 DA11498 from the William T. Grant Foundation and the National Institute on Drug Abuse.

We thank Karen D'Avanzo, Adam Goldstein, Julie Feldman Golovcsenko, Keith Jacoby, Scyatta Wallace, and Gretta Cushing for their help with the collection and management of the data presented in this article. We thank the school administrators who supported this project and the students who agreed to participate.

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Figure 1.
Patterns of substance use by cluster.

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Table 1
Unconditional Growth Curves for Substance Use and Other Dimensions of Psychosocial Adjustment

	Substance Use	Social Anxiety	Physiological Distress	Depression	Delinquent Behavior	Peer Acceptance	Assertiveness	Frustration Tolerance	Task Orientation	Academic Performance
Fixed Effects										
Intercept	5.20 (0.33) [‡]	2.86 (0.11) [‡]	3.84 (0.13) [‡]	11.16 (0.43) [‡]	0.46 (0.02) [‡]	2.87 (0.12) [‡]	2.57 (0.05) [‡]	2.87 (0.04) [‡]	2.91 (0.06) [‡]	11.38 (0.20) [‡]
Growth Rate	1.14 (0.14) [‡]	−0.18 (0.06) [‡]	−0.11 (0.07)	−0.18 (0.22)	−0.05 (0.01) [‡]	−0.25 (0.07) [‡]	0.06 (0.04) [‡]	0.05 (0.03)	−0.01 (0.04)	0.01 (0.08)
Random Effects										
Intercept	27.54 (2.67) [‡]	2.28 (0.32) [‡]	3.52 (0.46) [‡]	41.50 (4.46) [‡]	0.16 (0.12) [‡]	1.81 (0.37) [‡]	0.27 (0.07) [‡]	0.18 (0.05) [‡]	0.58 (0.09) [‡]	9.06 (0.96) [‡]
Growth Rate	2.75 (0.53) [‡]	−0.27 (0.15) [‡]	5.19 (1.20) [‡]	5.38 (1.21) [‡]	0.02 (0.00) [‡]	0.02 (0.16)	0.03 (0.04)	0.11 (0.03) [‡]	0.13 (0.04) [‡]	0.33 (0.18) [‡]
Covariance	−0.36 (0.89)	0.26 (0.12) [‡]	0.37 (0.15) [‡]	−5.19 (1.78) [‡]	−0.04 (0.01) [‡]	−0.33 (0.20)	0.02 (0.04)	−0.10 (0.04) [‡]	−0.13 (0.05) [‡]	−0.46 (0.31)
Residual	4.23 (0.41) [‡]	1.39 (0.13) [‡]	1.72 (0.17) [‡]	11.22 (1.08) [‡]	0.03 (0.00) [‡]	2.30 (0.21) [‡]	0.51 (0.05) [‡]	0.44 (0.04) [‡]	0.44 (0.04) [‡]	0.03 (0.00) [‡]

Note: Values represent parameter estimates with the standard error in parentheses. Because of missing data, sample size for the different constructs ranged from $n = 292$ students with 756 observations for Substance Use to $n = 287$ students with 746 observations for Academic Performance.

[‡]Fixed and random effects that differ significantly from 0 ($p < .10$).

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Table 2

Between-Cluster Differences in Growth Curves for Other Dimensions of Psychosocial Adjustment

	Social Anxiety	Physiological Distress	Delinquent Behavior	Depression	Peer Acceptance	Assertiveness	Frustration Tolerance	Task Orientation	Academic Performance
Fixed Effects									
Intercept									
Minimal Use	2.59 (0.18) [*]	3.11 (0.21) [*]	9.53 (0.69) [*]	0.23 (0.04) [*]	2.31 (0.19) [*]	2.52 (0.08) [*]	2.87 (0.07) [*]	3.30 (0.09) [*]	13.01 (0.30) [*]
Late Escalating Use	2.60 (0.24)	3.58 (0.28)	10.36 (0.91)	0.40 (0.05) [†]	3.11 (0.25)	2.66 (0.11)	3.00 (0.09)	3.01 (0.12)	11.59 (0.39) [†]
Early Escalating Use	3.21 (0.32)	4.35 (0.37) [†]	10.61 (1.17)	0.63 (0.06) [†]	3.17 (0.33)	2.47 (0.15)	2.99 (0.12)	2.87 (0.16)	10.38 (0.51) [†]
Declining Use	2.98 (0.36)	4.42 (0.42) [†]	11.82 (1.34)	0.52 (0.07) [†]	2.93 (0.36)	2.69 (0.16)	2.71 (0.14)	2.73 (0.17) [†]	10.64 (0.58) [†]
Persistently High Use	3.31 (0.25)	4.78 (0.29) [†]	14.84 (0.92) [†]	0.78 (0.05) [†]	3.44 (0.25) [†]	2.57 (0.11)	2.75 (0.09)	2.22 (0.12) [†]	9.29 (0.40) [†]
Growth Rate									
Minimal Use	-0.07 (0.10)	-0.10 (0.12)	0.42 (0.34)	-0.02 (0.02)	-0.08 (0.11)	0.11 (0.06)	0.10 (0.06)	-0.01 (0.06)	-0.01 (0.13)
Late Escalating Use	0.19 (0.14)	-0.13 (0.15)	-0.49 (0.45)	-0.03 (0.02)	-0.32 (0.15)	-0.04 (0.08)	-0.04 (0.07)	-0.06 (0.08)	-0.07 (0.16)
Early Escalating Use	-0.29 (0.18)	-0.07 (0.21)	0.55 (0.61)	-0.04 (0.03)	-0.26 (0.20)	0.06 (0.10)	0.04 (0.10)	-0.11 (0.11)	-0.24 (0.23)
Declining Use	-0.29 (0.21)	-0.27 (0.24)	-1.28 (0.71)	-0.13 (0.04) [†]	-0.16 (0.23)	0.09 (0.12)	0.08 (0.12)	0.16 (0.13)	0.32 (0.26)
Persistently High Use	-0.22 (0.15)	0.02 (0.17)	-0.89 (0.51)	-0.12 (0.02) [†]	-0.53 (0.16)	0.09 (0.09)	0.01 (0.08)	0.02 (0.09)	0.13 (0.19)
Random Effects									
Intercept	2.23 (0.32) ^{††}	3.15 (0.43) ^{††}	38.43 (4.22) ^{††}	0.11 (0.01) ^{††}	1.65 (0.36) ^{††}	0.27 (0.07) ^{††}	0.18 (0.05) ^{††}	0.44 (0.08) ^{††}	7.08 (0.80) ^{††}
Growth Rate	0.28 (0.12) ^{††}	0.41 (0.15) ^{††}	5.19 (1.20) ^{††}	0.02 (0.00) ^{††}	0.01 (0.16)	0.03 (0.04)	0.12 (0.03) ^{††}	0.14 (0.04) ^{††}	0.34 (0.18)
Covariance	-0.27 (0.15)	-0.51 (0.20) ^{††}	-4.41 (1.73) ^{††}	-0.03 (0.00) ^{††}	-0.28 (0.19)	0.02 (0.04)	-0.10 (0.04) ^{††}	-0.13 (0.05) ^{††}	-0.44 (0.29)
Residual	1.39 (0.13) ^{††}	1.70 (0.16) ^{††}	11.13 (1.07) ^{††}	0.03 (0.00) ^{††}	2.30 (0.21) ^{††}	0.51 (0.05) ^{††}	0.36 (0.03) ^{††}	0.44 (0.04) ^{††}	2.15 (0.21) ^{††}

Note: Values represent parameter estimates with the standard error in parentheses. Because of missing data, sample size for the different constructs ranged from $n = 290$ students with 751 observations for Social Anxiety, Physiological Distress, and Delinquency to $n = 287$ students with 746 observations for Academic Performance.

^{*}Intercepts and growth rates for the cluster with minimal to no use that differ significantly from 0 ($p < .02$).

[†]Intercepts and growth rates for each construct that differ significantly from those for the cluster with minimal to no use after the modified Bonferroni procedure developed by Holm.

^{††}Random effects that differ significantly from 0 ($p < .02$).