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## The relation of adolescent substance use to young adult autonomy, positive activity involvement, and perceived competence

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### **Abstract**

The current paper uses data from a longitudinal study of a high-risk sample to test the relation between adolescent alcohol and drug use and later young adult autonomy, positive activity involvement, and perceived competence. Participants (children of alcoholics and demographically matched controls) were assessed in three annual interviews in adolescence (mean age: 12.7 years at Time 1) and then again 5–7 years later, in young adulthood (median age: 20 years). Path analyses and latent growth curve models tested the effects of adolescent substance use on both self-reported and collateral-reported outcomes, controlling for correlated risk factors (parental alcoholism, adolescent psychopathology, and parental support), preexisting levels of the outcome, and concurrent young adult substance use. Results showed that adolescent drug use had a significant, unique negative effect on later autonomy and perceived competence. Alcohol use effects were more complex. Adolescent heavy drinking was associated with less positive adult outcomes, but more so in collateral reports than in self-reported outcomes. Moreover, young adult heavy drinking was either uncorrelated with or positively correlated with higher levels of perceived competence, suggesting different developmental significance of alcohol use in adolescence than in young adulthood.

Adolescence is the developmental period in which substance use is typically initiated, and some form of experimentation with substance use (particularly alcohol use) is relatively common in the adolescent years. For example, national data suggest that 81% of 12th graders have consumed alcohol at some point in their lives (Johnston, Bachman, & O'Malley, 1997). However, controversy exists about the extent to which adolescent substance use should be considered a normal and relatively benign feature of adolescent development (Shedler & Block, 1990).

One aspect of this debate revolves around the question of whether or not substance use in adolescence has any significant long-term implications for later development and adult outcomes. A large body of research literature and public health effort has gone into deterring adolescent alcohol and drug use in part based on the premise that such use has negative consequences for the adolescent's later life. Indeed, some of these negative consequences appear relatively straightforward and intuitive. For example, driving a motor vehicle while intoxicated raises risk for accidents and injuries, heavy alcohol consumption during pregnancy raises risk for damage to the developing fetus, and long-term cigarette smoking raises risk for nicotine addiction, cancer, and cardiovascular and respiratory diseases (National Institute of Alcohol Abuse and Alcoholism, 1997; United States Department of Health and Human Services, 1988; 1994). However, negative psychosocial ef-

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fects of adolescent substance use have been harder to document. Moreover, despite the existing longitudinal literature on adolescent substance use, most studies have focused on the etiology of substance use rather than its consequences. That is, substance use is most often studied as an outcome rather than as a predictor (Newcomb & Bentler, 1988). Thus, there is relatively little information about the implications of adolescent substance use for later young adult development.

There are multiple mechanisms by which adolescent alcohol and drug use might exert negative effects on psychosocial outcomes (see Newcomb & Bentler, 1988, for a review). At the simplest level, direct pharmacological effects of the substance might be performance impairing. For example, substance use may interfere with studying for an important test or interfere with job performance. Because such pharmacological effects are likely to be immediate and time limited, typical longitudinal studies are likely to detect only their cumulative effects, only if the impairment is repeated over time. In addition to these direct, performance-impairing effects, substance use may cause psychosocial consequences through a simple addictive model. To the extent that adolescent substance use raises risk for chronic use and physical or psychological dependence, impaired occupational, social, and psychological functioning will result (Glantz & Pickens, 1992). Consistent with either or both of these models, Jessor, Donovan, and Costa (1991) found that adolescent substance use was unrelated to adult outcomes unless the use persisted into adulthood. Adolescents who discontinued their substance use by young adulthood showed minimal impact. However, this study followed a middle-class sample who had relatively low levels of use during adolescence, and Jessor et al. (1991) called for replication of the findings in higher risk populations.

In addition to mechanisms that involve the pharmacological effects of substances either on performance or on risk for addiction, there are more indirect ways that adolescent substance use might influence psychosocial outcomes (viz., by influencing adolescent emerging developmental competency). Baumrind

and Moselle (1985) suggest that adolescent substance use may promote a false sense of reality that interferes with the ability to evaluate and respond to environmental demands, while simultaneously permitting avoidance of these demands. Impaired coping abilities will be the result. Similarly, they suggested that adolescent substance use will have negative effects on parent-child relationships and peer relationships. In particular, Baumrind and Moselle (1985) suggest that adolescent drug use will create a false sense of autonomy while actually undermining mature relationships. Adolescents with impairments in these developmental capacities will be at risk for broader occupational, social, and psychological problems.

Despite the importance of this theory, it has been largely untested empirically and the impact of adolescent substance use on the ability to establish autonomy, and to achieve competent involvement in positive activities, remains largely unknown. Indirect evidence about developmental competence can be found in studies of the relation between adolescent substance use and the occupancy of adult roles. Here data suggest that adolescent substance use is associated with early entries into marriage and work, but with less successful performance in these roles (i.e., more divorce and job instability; Newcomb & Bentler, 1988). Newcomb and Bentler (1988) suggest that adolescent substance use creates a situation of "pseudomaturity" in that drug-using adolescents prematurely seek out (and are thrust into) adult roles without the necessary skills for effective role performance.

Given the relative lack of data in this area, the current analyses focus on the implications of adolescent substance use for young adults' autonomy, involvement in positive activities, and perceived competence in these activities. Baumrind and Moselle's (1985) theory would suggest that adolescent substance use is associated with lower levels of autonomous functioning and less ability to achieve competence in positive activities. However, the impact of adolescent substance use may differ depending on whether the adolescent uses alcohol or illegal drugs. Adolescent alcohol use in the absence of illegal drug use has been associ-

ated with positive young adult social outcomes (less loneliness, more social support), but illegal drug use in adolescence has been associated with more loneliness and less social support (Newcomb & Bentler, 1988). Extending these results to the realms of autonomy, positive activity involvement, and competence suggests that adolescent alcohol and drug use should be considered separately as predictors of later outcomes.

Other methodological complexities also limit existing studies and make it difficult to assess the consequences of adolescent substance use on young adult outcomes. Perhaps most important, adolescent alcohol and drug use do not arise in a vacuum but are embedded in a complex network of personal, familial, social, and peer risk factors that may both contribute to adolescent alcohol and drug use and may also be responsible for later negative outcomes. For example, negative young adult outcomes may result from the impulsivity, sensation seeking, and conduct problems that are associated with adolescent substance use (Leigh & Stall, 1993).

Thus, a common underlying risk diathesis may actually influence both adolescent substance use and young adult outcomes (Brook, Cohen, & Brook, 1998). This risk diathesis may represent a "third variable" that causes both adolescent substance use and young adult outcomes, such that what appear to be effects of adolescent drug use on later outcomes are spurious. Alternatively, these correlated risk factors may represent mediating mechanisms that account for the effects of adolescent substance use. For example, if adolescent substance use causes adolescents to become depressed, then the depression might impair adolescents' abilities to engage in positive activities and relationships. Whether correlated risk factors represent "third variables" or mediators of substance use effects, it is important to consider them when evaluating the impact of adolescent substance use on adult outcomes.

For these reasons, the current analyses consider the impact of adolescent substance use in the context of parental alcoholism, adolescent symptomatology, and parental supportiveness as correlated risk factors. Brook et al.

(1998) note that parental psychopathology may explain both adolescent substance use and later negative outcomes, but few studies have the information necessary to consider this alternative. Parental alcoholism is clearly linked with increased risk of adolescent and young adult substance use (Chassin, Pitts, DeLucia, & Todd, 1999; Chassin, Rogosch, & Barrera, 1991; Sher, 1991). Parent alcoholism has also been linked to adolescents' conflictual relationships with parents (Barrera, Li, & Chassin, 1995; Jacob & Leonard, 1994), to deficits in self-regulation that can impair the development of social relationships (Moss, Vanyukov, Majumder, Kirisci, & Tarter, 1995; Sher, Walitzer, Wood, & Brent, 1991), and to a pattern of pseudoautonomy in which children of alcoholics (COAs) prematurely disengage from parents in a flight from parental failure (Wright, Frank, & Pirsch, 1992). Thus, parent alcoholism could provide a common diathesis underlying both adolescent substance use and young adult negative outcomes. Similarly, both poor adolescent-child relationships (Brook, Brook, Gordon, White-man, & Cohen, 1990) and adolescent symptomatology (high levels of internalizing and externalizing symptoms; Brook et al., 1998) are associated both with adolescent substance use and with later negative outcomes. Accordingly, the current study considered both parent-adolescent supportive relationships and adolescent levels of symptomatology when predicting young adult outcomes.

Finally, a difficulty in investigating the impact of adolescent substance use on later outcomes is that substance use itself is a complex construct, and different aspects of substance use may have different effects. For example, Shedler and Block (1990) suggested that the extent of substance use was important, with light use associated with positive outcomes and heavy use associated with negative outcomes. Similarly, because substance use (particularly alcohol use) is an age-graded behavior that is differentially common and tolerated at different ages, age of onset of use might be predictive. This has been shown in terms of predicting the likelihood of later substance abuse disorders, with onset of alcohol use before age 14 years associated with greater like-

likelihood of alcohol diagnoses (Grant & Dawson, 1997) and onset of illegal drug use before age 15 years associated with greater likelihood of drug diagnoses (Robins & Pryzbeck, 1985). In addition, the rate of acceleration in use may predict later impairment. Using growth modeling techniques, Duncan, Alpert, Duncan, and Hops (1997) examined the impact of both the intercept of adolescent's alcohol use (the starting point of the trajectory) and the slope of use over time (individual differences in the rate of growth over time in alcohol use). They found that both adolescents' initial levels of alcohol consumption and their rate of escalation in drinking over time predicted later outcomes. Accordingly, the current study models both the age of onset, and the intercept and the slope of adolescent alcohol use as predictors of later outcomes, as well as different aspects of adolescent illegal drug use (age of onset, extent and duration of involvement).

In summary, the effects of adolescent alcohol and drug use on later young adult outcomes is an area of importance both for theory development and for public policy and public health efforts. Theoretically, adolescent substance use might influence later functioning because its pharmacological effects impair performance or cause addiction, or because it impairs the emerging developmental competencies and relationship skills that are necessary for successful functioning. However, because most studies concentrate on substance use etiology, the effects of adolescent alcohol and drug use have been less frequently examined. Moreover, these effects might vary as a function of what substance is used (particularly alcohol use vs. illegal drug use), and as a function of the extent of use, early onset of use, or duration of use. Finally, what appear to be effects of adolescent substance use might actually be due to correlated risk factors such as parental psychopathology, poor parenting, or other social or personal factors. To address these questions, the current study assessed the effects of adolescent alcohol and drug use on young adult autonomy, involvement in positive activities, and perceived competence in these activities. We examine these predictors in a multivariate con-

text of correlated risk factors including parent alcoholism, adolescent symptomatology, and parental social support.

## Method

### *Participants*

Participants were from an ongoing longitudinal study of parental alcoholism (Chassin, Curran, Hussong, & Colder, 1996; Chassin, Pillow, Curran, Molina, & Barrera, 1993; Chassin et al., 1991). At Time 1, there were 246 adolescents with at least one biological alcoholic parent who was also a custodial parent (COAs) and 208 demographically matched adolescents with no biological or custodial alcoholic parents (controls). The study included three annual assessments of the adolescents (mean age = 12.7 years at Time 1) and their parents, and a long-term follow-up conducted 5–7 years after the initial assessment.

A complete description of sample recruitment and representativeness is reported elsewhere (Chassin, Barrera, Bech, & Kossak-Fuller, 1992; Chassin et al., 1991). COA families were recruited using court records of DUI arrests ( $n = 103$ ), health maintenance organization wellness questionnaires ( $n = 22$ ), and community telephone screening ( $n = 120$ ). One family was referred by a local Veterans Administration hospital. Screening and recruitment were done by research team members (or by participating agencies when required because of confidentiality concerns).

COAs had to meet the following criteria: parents who reported being either Hispanic or non-Hispanic Caucasian, Arizona residency, age 10.5–15.5 years, English speaking, and no cognitive limitations that would preclude interview (e.g., severe mental retardation or psychosis). The sample was limited to Hispanics and non-Hispanic Caucasians in order to produce subsamples large enough for analyses. Finally, direct interview data had to confirm that a biological and custodial parent met *Diagnostic and Statistical Manual of Mental Disorders*, third edition (DSM-III; American Psychiatric Association, 1980), criteria for alcohol abuse or dependence (lifetime diagno-

ses using the Diagnostic Interview Schedule) or Family-History Research Diagnostic Criteria (FH-RDC), on the basis of reports by the other parent (if the alcoholic parent was not interviewed). At Time 1, interviews were conducted with 75.6% of biological fathers and 86.6% of biological mothers. When families had multiple eligible children, the child closest to age 13 years was selected.

Demographically matched control families were recruited using telephone interviews. When a COA participant was recruited, reverse telephone directories were used to locate families living in the same neighborhood. Families were screened to match the COA participant in ethnicity, family composition, target child's age (within 1 year), and socioeconomic status (using the property value code from the reverse directory). Direct in-person interview data were used to confirm that neither biological nor custodial parents met DSM-III criteria (or FH-RDC criteria) for lifetime diagnoses of alcohol abuse or dependence. At Time 1, interviews were conducted with 71.2% of biological fathers and 93.8% of biological mothers of the controls.

Recruitment biases because of selective contact with subjects or subject refusals are discussed in detail elsewhere (Chassin et al., 1991, 1992). Analyses of participation bias found that the sample was unbiased with respect to alcoholism indicators that were available in archival records (e.g., blood-alcohol level at the time of the arrest, Michigan Alcoholism Screening Test results). Moreover, the alcoholic sample showed similar rates of other psychopathology to those reported for a community dwelling alcoholic sample (Helzer & Pryzbeck, 1988). These data support the representativeness of the sample. However, subjects who refused participation were more likely to be Hispanic and, if there was an arrest record, more likely to be married at the time of the arrest (Chassin et al., 1992). Although the size of the bias was small and unrelated to archival indicators of alcoholism, some caution is warranted in generalization.

A long-term follow-up (hereafter referred to as Time 4) was conducted when the original adolescents were in young adulthood (ages 18–23 years, mean age = 20.4 years).

Sample retention was high and included 407 young adults (90% of the original target participants) comprised of 213 COAs (86.6% of the original sample) and 194 controls (93.3% of the original sample). Subject retention was unbiased by gender and ethnicity, but a greater proportion of COAs than controls were lost at follow-up,  $\chi^2(1, n = 454) = 5.45, p < .02$ .

At Time 4, young adult participants nominated peer informants to provide collateral data. Collateral reports were obtained for 345 participants (84.6% of the Wave 4 sample). Data suggested that collaterals had appropriate knowledge about the participant. For example, 87% of collaterals reported knowing the participant "very well," 93% had known the participant for more than a year, and 99% reported contact with the participant within the last 3 months. To allow comparison of self-reported and collateral-reported data, the current analyses selected participants who had collateral data (*Ns* ranged from 317 to 340 over different models because of missing data). The subsample in the current analyses was 48.2% female, 70% non-Hispanic Caucasian, 13% married, and 42% full-time students (mean age = 20.4 years). Collaterals were 51.8% female with a mean age of 23.9 years.

Selecting only subjects with collateral data introduces possible bias. Accordingly, we compared participants with and without collateral data on the variables in the current analyses. The groups were largely comparable, with no significant differences on 14 variables (*t* tests and chi-square comparisons). However, participants without collateral data were more likely to be COAs and to report more frequent heavy drinking in adolescence and young adulthood (*ps* < .05). Despite these few differences, subject selection status (i.e., collateral vs. no collateral) showed no significant interactions with any predictor variable in predicting any outcome variable. Thus, there is unlikely to be any appreciable selection bias affecting the results.

#### *Procedure*

Data were collected through computer-assisted interviews with the adolescents and

their parents, either at their residence or at the Arizona State University campus. Measures were programmed onto laptop computers, and all skip patterns were automatically implemented. Trained interviewers read each item aloud. All responses were close ended and entered directly into the computer. To minimize contamination, all family members were interviewed individually on the same occasion by different interviewers when possible. Interviewers were unaware of the group membership of the family and of the research questions (although the interview responses themselves revealed the extent of alcohol and drug use in the family). Interviews required 1–2 hr, and individuals were paid for their participation (up to \$65 over the waves).

To encourage honest responding, privacy and confidentiality were assured, and reinforced with a Department of Health and Human Services Certificate of Confidentiality. To minimize the possibility of being overheard, participants had the option of entering their response on the computer keyboard rather than making a verbal response.

Collateral data were collected using mailed questionnaires. Collaterals were paid \$20 for their participation.

### Measures

The measures of interest were part of the larger interview battery.

*Demographic variables.* The current analyses considered the effect of age (at Time 1), gender, and family structure. Family structure was operationalized as a dichotomous variable (living with both biological parents throughout the adolescent waves [77%] vs. any other family structure [23%]). Because a dichotomous ethnicity variable (non-Hispanic Caucasian vs. Hispanic) was unrelated to substance use variables and to young adult outcomes, ethnicity effects were not considered.

*Alcohol use in adolescence and adulthood.* At Waves 1–4, participants self-reported their frequency (from none to daily) of past-year heavy drinking (measured as consumption of

five or more drinks in one sitting). Growth in adolescent heavy drinking was modeled based on the first three repeated measurements. Growth model parameters (i.e., intercept and slope) were used to predict adult outcomes (see below for a detailed description of the growth modeling). Onset of heavy drinking (a dichotomous variable, younger than 14 years vs. 14 years or older; see Grant & Dawson, 1997) was also tested as a predictor. Young adult heavy drinking was treated as a cross-sectional covariate of the young adult outcomes.

As would be expected developmentally, the prevalence of past-year heavy drinking increased over the study (e.g., 12, 16, 24, and 54% over the four waves in the subsample that was analyzed). Prevalence data in our total sample were comparable to those in national data. For example, in young adulthood, prevalence of alcohol use was 80% among our targets versus 84% in the Monitoring the Future data (Johnston et al., 1997). However, as would be expected for a high-risk sample, rates of lifetime alcohol dependence diagnoses were higher in our sample (24 vs. 19% for those 18–24 years in national data; Grant, 1997).

*Drug use in adolescence and adulthood.* At each wave, adolescents self-reported their frequency (from none to daily) of past-year use of eight illicit drugs. Because of the low prevalence of illegal drug use in adolescence, growth in adolescent drug use was not modeled. Rather, a composite variable was created by averaging four components. One component was the duration of use (from 0, reflecting abstinence at all waves, to 4, reflecting entry into the study as a drug user and use at all three waves). A second component was duration of weekly use (from 0, reflecting no weekly use, to 3, reflecting weekly use of some illegal drug reported at all three waves). A third component was the maximum frequency of use reported over the waves (from 0, reflecting abstinence, to 7, reflecting daily use). A fourth component was the number of different drugs used over the waves (from 0 to 8). The composite variable was formed by

averaging these four component variables. (To eliminate differential weighting of components, each variable was scaled to have a standard deviation of 1 prior to averaging.)

Because drug use at an early age is predictive of later drug diagnoses, a dichotomous age of onset of drug use variable was also used as a predictor (reflecting reports of any drug use vs. no drug use before age 15 years, based on Robins & Przybeck, 1985). Young adult drug use at Time 4 was computed by averaging frequency of past-year use, highest frequency of past-year use of any drug, and number of drugs used in the past year (again rescaling these variables to have a standard deviation of 1 prior to averaging). Young adult drug use was treated as a cross-sectional covariate in predicting young adult outcomes.

As expected developmentally, the prevalence of illegal drug use increased over time (e.g., 8, 12, 12, and 33% of the subsample in the current analyses reported past-year illegal drug use over the four waves). Rates of illegal drug use in the past year were slightly higher than those in national data (e.g., 31 vs. 25% in a similarly aged subsample in the Monitoring the Future data; Johnston et al., 1997). In young adulthood, our sample showed slightly higher rates of past year illegal drug use than did national data (e.g., 33 vs. 28% in the Monitoring the Future data; Johnston et al., 1997). As expected in a high-risk sample, our rates of lifetime drug dependence (13% at Time 4) were higher than those for national data (7% for those 15–24 years in the National Comorbidity Study (Warner, Kessler, Hughes, Anthony, & Nelson, 1995).

*Common risk factors for adolescent substance use and young adult outcomes.* For adolescent substance use to be considered a cause of later negative outcomes, adolescent substance use must be shown to have an effect over and above common “third variables” (that are associated both with adolescent use and with adult outcomes). To address this question, the current analyses considered the effects of parent alcoholism, adolescent internalizing and externalizing symptoms, and parent–adolescent supportive relationships.

*Parent alcoholism.* At Time 1, parents’ lifetime DSM-III diagnoses of alcoholism (abuse or dependence) were obtained with a computerized version of the DIS interview (Version 3; Robins, Helzer, Croughan & Ratcliff, 1981) or FH-RDC criteria for noninterviewed parents. For the present analyses, parent alcoholism was defined as a dichotomous variable (no alcoholic biological parents vs. one or two alcoholic biological parents).

*Adolescent symptomatology.* At each wave, adolescents self-reported their level of symptomatology in the past 3 months using items from the Child Behavior Checklist (Achenbach & Edelbrock, 1981). For internalizing symptoms, adolescents reported on 7 items that loaded on the Internalizing factor for both boys and girls ages 12–16 years. Internal consistencies (coefficient alpha) ranged from .76 to .79 over waves. For externalizing symptoms, adolescents reported on 21 items that loaded on the Externalizing factor for both boys and girls ages 12–16 years. Internal consistencies ranged from .89 to .90 over measurement waves. For the current analyses, each participant’s score was computed by averaging across the available scale scores from Times 1–3. Internal consistencies of these aggregate measures were .78 and .83 for internalizing and externalizing symptoms, respectively.

*Adolescent social support from parents.* At each wave, based on items from Furman and Buhrmester (1985), adolescents reported the level of social support received from each biological parent over the past 3 months (on a 5-point scale ranging from *little or none* to *the most possible*). The six items that comprised the scale corresponded to the six domains of social relationships (i.e., companionship, instrumental aid, intimacy, affection, admiration, and reliable alliance) identified by Weiss (1974). Internal consistencies ranged from .79 to .84 for social support received from mother and from .82 to .85 for social support received from father across the three waves. For the current analyses, each participant’s score was computed by averaging across the available scale scores from Times 1–3. Because general parental social support was of interest, the



scale scores were averaged across parents as well. The internal consistency for this aggregate measure was .89.

*Adult outcome variables and adolescent precursors of the adult outcomes.* For adolescent substance use to be considered a unique predictor of some adult outcome, it should be shown that adolescent use has an effect above and beyond preexisting levels of this outcome. Accordingly, the current analyses considered adolescent precursors available in the data set for each outcome variable.

*Involvement in positive activities in adolescence and adulthood.* At Time 3, adolescents reported their degree of past-year involvement (5-point scale ranging from *none* to *a lot*) in the following six activities: sports, church activities, music, hobbies, volunteer work, and social life. For the current analyses, each participant's score was computed as the average level of involvement over the six possible activities (mean = 3.39, *SD* = .79); the same items were readministered in adulthood (mean = 2.89, *SD* = .72). At Time 4, collaterals also reported on the young adult's involvement in positive activities (mean = 2.73, *SD* = .80).

*Perceived competence in positive activities in adolescence and adulthood.* At Time 3, adolescents self-reported their perceived competence in each of the positive activities listed above (5-point response scale ranged from *very below average* to *very above average*). For the current analyses, each participant's score was computed as the average level of competence over the activities in which they were involved (mean = 3.59, *SD* = .54). The same items were readministered in adulthood (mean = 3.55, *SD* = .58). At Time 4, collaterals also reported on young adult competence in positive activities (mean = 3.33, *SD* = .83).

*Encouragement of autonomy in adolescence and general autonomy in young adulthood.* At Time 3, adolescents reported on mother's and father's encouragement of autonomy using seven items (for each parent) adapted from Steinberg's questionnaire (Steinberg, Mounts, Lamborn, & Dornbusch, 1991; e.g., "How often did your mother let you make your own plans for things you wanted to do?" and "How often did your mother tell

you that her ideas were correct and that you should not question them?") [reverse coded]). Internal consistencies were .73 and .75 for mother's and father's encouragement of autonomy, respectively. For the current analyses, each participant's score was computed as a measure of general parental encouragement of autonomy (i.e., the score was averaged across parents; internal consistency = .83).

At Time 4, young adults self-reported their level of general autonomy using 13 items written by project staff. These items were written after reviewing previous measures in an attempt to capture "healthy" autonomy rather than estrangement and detachment (cf. Ryan & Lynch, 1989). Item generation also included focus groups with college students. Sample items included "I feel comfortable making my own decisions," "I feel that I am my own person," "I feel I am an independent person," "I feel capable of doing things for myself," and "I can make and carry out my own life plans." Pilot testing with university freshman revealed adequate psychometric properties (e.g., factor loadings ranged from .47 to .66 on a single factor model, internal consistency = .85; Montgomery, Li, Friedman, Barrera, & Chassin, 1995). Moreover, significant positive correlations with measures of perceived social support and close relationships with parents and best friends suggested that this measure did not reflect social estrangement and detachment (Montgomery et al., 1995). Means and standard deviation for the self-report were 4.02 and .50; for the collateral report, mean = 3.86, *SD* = .61.

## Results

### *Zero-order correlations*

The zero-order correlations among all variables are presented in Table 1. As shown in the table, higher levels of autonomy in young adulthood (in both self-report and collateral report) were associated with less adolescent drug use, lower levels of adolescent internalizing and externalizing symptomatology, and greater parental encouragement of autonomy in adolescence. Self-reported young adult

**Table 1. Zero-order correlations among all predictor and outcome variables**

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
1. Parental alcoholism	1.00																					
2. Family structure	0.07	1.00																				
3. Adolescent externalizing	0.20**	0.13*	1.00																			
4. Adolescent internalizing	0.13*	0.05	0.58**	1.00																		
5. Social support	-0.08	-0.19**	-0.44**	-0.32**	1.00																	
6. Time 3 autonomy	-0.13*	-0.04	-0.36**	-0.25**	0.30**	1.00																
7. Time 3 positive activities	-0.13*	-0.13*	-0.28**	-0.17**	0.38**	0.12*	1.00															
8. Time 3 competence	-0.06	-0.04	-0.07	-0.08	0.25**	0.07	0.39**	1.00														
9. Adolescent drug use	0.17**	0.25**	0.39**	0.20**	-0.28**	-0.01	-0.24**	-0.04	1.00													
10. Heavy drinking intercept	0.10	0.15	0.29**	0.15	-0.24**	0.12	-0.23**	0.00	0.81**	1.00												
11. Heavy drinking slope	0.16	0.10	0.38**	0.13	-0.27**	-0.42**	-0.14	-0.04	0.26**	0.12	1.00											
12. Gender	-0.04	0.04	0.05	-0.23**	0.03	-0.08	0.06	0.03	-0.03	-0.01	-0.03	1.00										
13. Age	-0.09	0.01	0.16**	0.17**	-0.19**	0.04	-0.17**	-0.05	0.28**	0.40**	0.12	-0.03	1.00									
14. Time 4 drug use	0.13*	0.22**	0.26**	-0.05	-0.13*	-0.10	-0.07	-0.01	0.25**	0.12	0.24*	0.17**	-0.11*	1.00								
15. Time 4 heavy drinking	0.17**	0.12*	0.26**	0.00	-0.17**	-0.14*	-0.07	0.01	0.18**	0.10	0.31**	0.29**	0.11	0.47**	1.00							
16. SR autonomy	-0.04	-0.02	-0.17**	-0.18**	0.16**	0.15**	0.10	0.17**	-0.15**	-0.03	-0.04	0.03	0.05	0.03	0.01	1.00						
17. CR autonomy	-0.07	-0.11*	-0.23**	-0.11	0.09	0.11	0.05	0.00	-0.23**	-0.15	-0.17	0.01	0.00	-0.15*	-0.13*	0.25**	1.00					
18. SR positive activities	-0.18**	-0.09	-0.26**	-0.19**	0.30**	0.08	0.45**	0.21**	-0.11	-0.01	-0.02	0.24**	-0.11*	-0.08	-0.02	0.15*	0.09	1.00				
19. CR positive activities	-0.18**	-0.15**	-0.28**	-0.20**	0.26**	0.13*	0.39**	0.16**	-0.21**	-0.24**	0.01	0.19**	-0.05	-0.16**	-0.15**	0.03	0.32**	0.57**	1.00			
20. SR competence	0.06	-0.02	-0.11	-0.13*	0.15**	0.00	0.08	0.29**	-0.12*	-0.14	-0.18	0.18**	-0.08	0.00	0.12*	0.16*	0.01	0.28**	0.17**	1.00		
21. CR competence	-0.04	-0.03	-0.20**	-0.13*	0.17**	0.09	0.23**	0.20**	-0.13*	-0.03	-0.09	0.10	0.04	-0.04	0.02	0.33**	0.29**	0.55**	0.17**	1.00		

Note: Sample sizes used in correlations range from  $N = 302$  to  $N = 340$  depending on relevant outcome variable. SR, self-report of the variable; CR, Collateral-report of the variable. \* $p < .05$ . \*\* $p < .01$ .

autonomy was also associated with more parental support in adolescence, and greater adolescent involvement in and perceived competence in positive activities. Collateral-reported autonomy was also associated with living in intact families, with less adolescent alcohol use, and with less young adult drug use.

Young adults' involvement in positive activities (in both self-report and collateral report) was associated with having nonalcoholic parents, being male, having lower levels of adolescent internalizing and externalizing symptomatology, receiving more parental social support in adolescence, being more involved in and more competent in positive activities in adolescence, and having lower levels of adolescent drug use. Self-reported positive activity involvement was also associated with being younger and with more frequent heavy drinking in young adulthood. Collateral-reported positive activity involvement was also associated with living in intact families, having parents who encouraged autonomy in adolescence, less frequent heavy drinking in adolescence, and less young adult drug use.

Perceived competence in positive activities (in both self-report and collateral report) was associated with lower levels of internalizing and externalizing symptoms in adolescence, more parental support in adolescence, higher competence in adolescent positive activities, lower levels of adolescent drug use, and higher levels of young adult heavy drinking. Self-reported competence was also associated with being male and with less adolescent drinking. Collateral-reported competence was also associated with having parents who encouraged autonomy in adolescence and being more involved in positive activities in adolescence.

These data suggest that adolescent levels of drug use and alcohol use were associated with lowered levels of young adult autonomy, positive activity involvement, and competence. Given these results, the next goal was to examine whether adolescent substance use was still predictive in a multivariate context that controlled for correlated risk factors and preexisting levels of the outcome variable.

#### *The relation of adolescent illegal drug use to young adult outcomes*

The relation of adolescent illegal drug use to young adult autonomy, positive activity involvement, and perceived competence in positive activities was tested with path analysis (using EQS software). Separate models were estimated for each outcome with the collateral reports and self-reports as correlated outcome variables (a total of three models). Age, gender, parental alcoholism, and family structure were allowed to freely covary and were specified to predict adolescent drug use, drug use onset, adolescent internalizing symptoms, adolescent externalizing symptoms, adolescent social support from parents, the adolescent precursor of the outcome variable, young adult drug use, and the adult outcome variables (both collateral and self-reports). Adolescent drug use, drug use onset, adolescent internalizing symptoms, adolescent externalizing symptoms, parental social support, the adolescent precursor of the outcome variable, and young adult drug use were all specified as predictors of the young adult outcome variables. However, because drug use onset failed to uniquely predict any outcome it was dropped from the final models. The error variances of the adolescent measures were allowed to freely covary, and each adolescent measure was specified as a predictor of young adult use. The error variances of the collateral and self-reported outcomes were allowed to freely covary. These models test the relation between adolescent illegal drug use and young adult outcomes controlling for correlated adolescent risk factors, for concurrent young adult drug use, and for preexisting levels of the young adult outcome variable.<sup>1</sup>

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1. A series of multiple regression analyses were conducted to determine whether there were significant interactions between the predictor variables and demographic variables in determining outcomes. For each demographic variable (separately for gender, socioeconomic status, and ethnicity) we tested the contribution of the set of all two-way interactions between the predictor variables and the demographic variable. In no case was the set of variables a significant contributor. The only significant individual interaction was between parental social support and gender in predicting positive activity involvement. Parental social support

**Table 2.** Unstandardized path coefficients to each of the three outcomes—autonomy, positive activity involvement, and competence in positive activities—from the drug use models

Predictor	Autonomy		Positive Activity Involvement		Competence in Positive Activities	
	Self-Report	Collateral Report	Self-Report	Collateral Report	Self-Report	Collateral Report
Adolescent drug use	-.13**	-.13**	.09*	.01	-.08*	-.08*
Young adult drug use	.07†	-.06	-.06†	-.06†	.00	.00
Adolescent precursor	.07†	.07†	.34***	.34***	.29***	.29***
Age	.04*	.04*	-.01	-.01	.02	.02
Gender	.01	.01	.33***	.33***	.19***	.19***
Parental alcoholism	.02	.02	-.15*	-.15*	.11*	.11*
Family structure	-.02	-.02	-.06	-.06	.02	.02
Adolescent internalizing symptoms	-.03	-.03	.03	.03	-.02	-.02
Adolescent externalizing symptoms	-.13	-.13	-.26*	-.26*	-.17†	-.17†
Parental social support in adolescence	.03	.03	.09†	.09†	.04	.04

\*\*\**p* < .001. \*\**p* < .01. \**p* < .05. †*p* < .10.

To determine whether the effect of adolescent drug use varied for self-reported versus collateral-reported outcomes, models were estimated in which the path coefficients in question were alternately freely estimated and constrained to equality across the two outcomes (i.e., self-reported vs. collateral-reported outcomes). The change in chi square across the two models was evaluated. To the extent that the path estimates significantly varied for self-reported and collateral-reported outcomes, this produced a significant increase in the chi-square value, indicating a significant decrement in model fit.

Table 2 presents the unstandardized coefficients (path estimates) from the models predicting young adult outcomes from adolescent drug use.<sup>2</sup> The table presents only estimates involving the outcome variables; for brevity, relations among the predictors are not dis-

cussed.<sup>3</sup> The values for the self-reported and collateral-reported outcomes are constrained to equality except in cases where this produced a significant decrement in model fit, dictating separate estimates for the two reports (see Table 2).

As shown in Table 2, adolescent drug use had a significant unique relation to young adult autonomy, such that adolescents with higher levels of drug use had significantly lower levels of autonomy in young adulthood. This was true for both self-reported and collateral-reported autonomy. This unique effect accounted for approximately 2% of the variance in autonomy. In addition, those whose parents encouraged autonomy in adolescence and older participants also showed higher levels of young adult autonomy in both self-reports and collateral reports. Those with higher levels of young adult drug use self-reported marginally higher autonomy. However, this

was significant for girls but not for boys. However, given the large number of tests, the pattern of results showed no evidence that the effect of any predictor significantly varied across gender, socioeconomic status, or ethnicity.

2. When testing equality constraints, it is more appropriate to base the equality constraints on the unstandardized solution (Pitts, West, & Tein, 1996). Because the estimates and tests are based on the unstandardized solution, we present the unstandardized path coefficients.

3. Although not of central interest to the current paper, the relations among predictor variables generally followed expected patterns, thus increasing confidence in the validity of the data. For example, as reported in other analyses of this data set (Chassin et al., 1991, 1993, 1996), parental alcoholism was associated with higher levels of adolescent alcohol use, more rapid escalation of alcohol use in adolescence, more adolescent drug use, and higher levels of adolescent internalizing and externalizing symptoms.

effect was not confirmed in collateral reports, and was not present in zero-order correlations, suggesting that it may be artifactual.<sup>4</sup>

In predicting young adult positive activities, there was an unexpected positive relation between adolescent drug use and the self-reported outcome, such that those with higher levels of adolescent drug use self-reported more young adult involvement in positive activities (see Table 2). This effect accounted for just over 1% of the variance in positive activities. However, this relation was not confirmed in collateral reports, and was not present in zero-order correlations, suggesting that it may be artifactual. In addition, those with lower levels of young adult drug use, those with higher levels of adolescent positive activity involvement, males, those with nonalcoholic parents, those with lower levels of adolescent externalizing symptoms, and those with higher levels of parental social support in adolescence showed higher levels of involvement in positive activities in young adulthood (in both self-reports and collateral reports; see Table 2).

In predicting perceived competence in positive activities in young adulthood, there was a significant unique effect of adolescent drug use, such that those with higher levels of adolescent drug use had lower levels of self-reported and collateral-reported competence in young adulthood. This unique effect accounted for just over 1% of the variance in perceived competence. In addition, those with higher perceived competence in adolescence, males, and those with lower levels of externalizing symptoms in adolescence showed higher levels of perceived competence in young adulthood (in both self-reports and collateral reports; see Table 2). There was an unexpected effect of parent alcoholism, such

that those with alcoholic parents also showed higher levels of perceived competence in young adulthood. However, this relation was not observed in the zero-order correlations, suggesting that it might be artifactual.

#### *The relation between adolescent heavy alcohol use and young adult outcomes*

In examining the relation between adolescent heavy drinking and young adult outcomes, we were interested in testing the effects of both adolescents' initial levels of heavy alcohol use and the effects of their escalation in heavy alcohol use over the 3 years of study. To achieve this goal, we used latent growth models (with EQS software), which allow for the estimation of subjects' initial heavy-drinking levels (the intercept factor) and their growth over time in heavy drinking (the slope factor). For all subjects who reported at least one heavy-drinking episode, we first tested whether a linear growth model fit the data observed in adolescence (i.e., at Waves 1, 2, and 3). We tested this by fixing the loadings of the Waves 1, 2, and 3 scores on the slope factor to 0, 1, and 2 respectively. This model was a good fit to the data,  $\chi^2(1) = 1.25, p = .26, N = 237$ . Moreover, this model produced variance estimates for the intercept and the slope factors that were significantly greater than zero (intercept factor variance of .44,  $p < .001$ ; slope factor variance of .15,  $p < .01$ ). This indicates that there was significant individual variation in adolescents' initial levels of heavy drinking and also significant individual differences in their rate of growth over time in heavy drinking. Given this individual variation, it is possible to test whether adult outcomes vary as a function of individual differences in adolescent initial heavy drinking and in adolescent growth over time in heavy drinking.

However, in attempting to predict young adult outcomes from the intercept and slope of these growth curves, a potential problem is the appreciable percentage of participants who reported no episodes of past-year heavy drinking at any of the measurement waves (30%). Accordingly, we divided subjects into those who did and did not report at least one

4. Examining a series of sequential models predicting autonomy revealed that the simultaneous inclusion of parental encouragement of autonomy at Wave 3 and externalizing symptoms produced the unexpected positive relation between young adult drug use and autonomy. This same pattern (simultaneous inclusion of the Wave 3 precursor and externalizing symptoms in predicting the Wave 4 outcome) created several other surprising (and apparently artifactual) relations reported below.

heavy-drinking episode at some measurement wave. The models were estimated for the two subgroups and stacked. In the nondrinking subsample, none of the heavy-drinking variables or age of drinking onset were included (since these were constant for this group). However, the inclusion of the non-heavy-drinking group provided more stable estimates for the effects of other variables that did not involve drinking (e.g., the effects of symptomatology, parental support). We also tested whether the predictor variables had different effects on young adult outcomes depending on whether the adolescent had ever reported a heavy-drinking episode.

Prior to the growth modeling analyses, regressions were performed to test the effects of the stacking variable (any heavy drinking vs. no heavy drinking) on the adult outcomes (both collateral and self-reports of each outcome as separate criteria, for a total of six analyses). All other predictors were also included. Significant unique effects of heavy-drinking status were observed for all three collateral-reported outcomes (all  $ps < .02$ ) such that having a heavy-drinking episode in adolescence was associated with lower collateral-reported autonomy, positive activity involvement, and perceived competence in adulthood. Participants who had a heavy-drinking episode in adolescence also self-reported less positive activity involvement ( $p < .001$ ).

The models predicting self-reported and collateral-reported young adult outcomes from adolescent heavy alcohol use were specified in the same way as those described earlier for adolescent illegal drug use with the following exceptions. First, adolescent alcohol use included two predictor variables—the adolescent's initial heavy-drinking level (the intercept) and the adolescent's rate of growth over time in heavy drinking (the slope factor; correlation between intercept and slope = .12). Second, because the models were stacked across heavy-drinking versus non-heavy-drinking subjects, two sets of equality constraints were tested: (a) cross-group equality constraints and (b) cross-reporter equality constraints (as for the drug models). For all analyses, cross-group equality constraints

were tested and, if appropriate, imposed first, followed by cross-reporter equality constraints. Finally, the relations of young adult (Time 4) heavy drinking to the slope and intercept factors were specified as covariances. This allowed Time 4 heavy drinking to serve as a control variable while not affecting the growth factor estimates (i.e., Time 4 heavy drinking was not treated as an indicator of growth in alcohol use). As with the drug use models described earlier, age of heavy-drinking onset showed no unique predictive power and was trimmed from the final models.<sup>5</sup>

Table 3 presents the relations between the predictor variables and young adult outcomes. As reported earlier for the drug use data, the estimates are for models in which effects are constrained to be equal across self-reported and collateral-reported outcomes except in cases for which this constraint produced a significant decrement in model fit (indicating that separate estimates were required for self-reported and collateral-reported outcomes). In addition, when estimates could not be constrained to equality for the drinking and nondrinking subgroups, both estimates are shown in the table (with estimates for the nondrinking subgroup in parentheses).

In predicting young adult autonomy, neither the intercept nor slope factor was a significant unique predictor. However, the joint effects of the slope and intercept together significantly predicted collateral-reports of autonomy,  $\chi^2(2) = 7.84, p < .02$ , but not self-re-

5. Given the current sample size, it is not advisable to test interactions between demographic variables and the growth factors. Instead, we ran a series of multiple regression analyses in which alcohol use at each wave of measurement was treated as a separate predictor. We tested the contribution of the set of all two-way interactions between each predictor and a demographic variable (separately for gender, socioeconomic status, and ethnicity). There were no significant effects of any of these sets of interactions or of any individual interaction terms, save for the significant interaction between parental social support and gender in predicting Wave 4 positive activity involvement. For both collateral and self-reported outcomes, parental social support was significant for girls and not for boys. However, given the large number of tests, the pattern of results did not suggest that effects varied across gender, ethnicity, or socioeconomic status.

**Table 3.** Unstandardized path coefficients to each of the three outcomes—autonomy, positive activity involvement, and competence in positive activities—from the alcohol use models

Predictor	Autonomy		Positive Activity Involvement		Competence in Positive Activities	
	Self-Report	Collateral Report	Self-Report	Collateral Report	Self-Report	Collateral Report
Adolescent heavy drinking intercept	.12	-.21	.16†	-.20†	-.19*	.00
Adolescent heavy drinking slope	-.17	-.17	.40	.40	-.35†	-.35†
Young adult heavy drinking	.02	.02	.00	.00	.08***	.08***
Adolescent precursor	.04	.04	.37***	.17**	.28***	.28***
				(.37***)		
Age	.03	.03	-.02	.05	.03	.03
Gender	.03	.03	.38***	.38***	.18**	.18**
Parental alcoholism	.01	.01	-.10†	-.10†	.13*	.13*
Family structure	-.05	-.05	-.04	-.04	.07	.07
					(-.28†)	
Adolescent internalizing symptoms	-.09	.05	.08	.08	.01	.01
Adolescent externalizing symptoms	-.14	-.14	-.32**	-.32**	.02	-.30**
					(-.30**)	
Parental social support in adolescence	.04	.04	.10*	.10*	.02	.02

Note: When estimates cannot be constrained to equality across group, both group estimates are listed. The first estimate is from the drinking group; the second estimate, in parentheses, is from the nondrinking group.  
 \*\*\* $p < .001$ . \*\* $p < .01$ . \* $p < .05$ . † $p < .10$ .

ported autonomy. The joint effects of the slope and intercept accounted for 3% of the variance in collateral-reported autonomy. There were no other significant predictors.

In predicting young adult positive activity involvement, there was a significant unique effect of the intercept, but in opposite directions, in predicting self-reported and collateral-reported positive activity involvement. As expected, those with higher levels of heavy drinking in adolescence were perceived by their collaterals as less involved in young adult positive activities (accounting for 3% of the variance). Surprisingly, those with higher levels of heavy drinking in adolescence perceived themselves as more involved in young adult positive activities (accounting for 3% of the variance; see Table 3). The predicted negative effect of adolescent heavy drinking on collateral reports of positive activity involvement was maintained in the zero-order correlations. However, the unexpected positive relation between adolescent heavy drinking and self-reported young adult positive activity involvement was not present in the zero-order correlations, suggesting that it might be artificial. The joint effect of the intercept and

slope together explained significant variance (6%) in collateral reports of positive activity involvement,  $\chi^2(2) = 8.37$ ,  $p < .01$ , but not in self-reported positive activity involvement. In addition, those who had higher levels of adolescent positive activity involvement, males, children of nonalcoholics, and those with lower levels of adolescent externalizing symptoms had higher levels of young adult positive activity involvement (both self-reports and collateral reports).

In predicting perceived competence, there were effects of both the intercept and slope factor on self-reported competence. Those who had higher initial levels of adolescent heavy drinking and those who showed the steepest increases in heavy drinking over time perceived themselves as less competent in positive activities in young adulthood (accounting for 5 and 9% of the variance in self-perceived competence respectively; see Table 3). Those who increased their heavy drinking most steeply in adolescence were also seen by their collaterals as less competent (accounting for 3% of the variance), and the joint effect of the intercept and slope factor accounted for significant variance in both self-reported and

collateral-reported competence,  $\chi^2(2) = 12.62$ ,  $p < .001$ , and  $\chi^2 = 5.36$ ,  $p < .10$ , respectively. In addition, males and those who had higher levels of perceived competence in adolescence had higher levels of young adult perceived competence in both self-reports and collateral reports. Those with lower levels of adolescent externalizing symptoms had higher levels of young adult perceived competence (in collateral reports and self-reports for the nondrinking subgroup). Those who lived with two biological parents had higher levels of self-reported young adult competence (in the nondrinking group only). Finally, there were two unexpected effects. Those with alcoholic parents and those with higher levels of young adult heavy drinking had higher levels of perceived competence (both self-reports and collateral reports). The relation between parent alcoholism and young adult perceived competence was not present in the zero-order correlations, suggesting that it might be artifactual. However, the unexpected positive relation between young adult heavy drinking and young adult perceived competence was maintained in the zero-order correlations ( $ps < .01$ ) and was also maintained after controlling for age and gender.

### Discussion

The central goal of the current study was to examine the relation between adolescent substance use and later young adult positive outcomes, including autonomy, involvement in positive activities, and competence in these activities. Previous research has more typically examined adolescent substance use as an outcome variable than as a predictor, and most work on the consequences of adolescent substance use has been focused on later occupancy of adult roles or on adult role performance. Thus, there is relatively little information available about the impact of adolescent substance use on young adult psychosocial development (Newcomb & Bentler, 1988). Moreover, the current study attempted to address some of the methodological complexities in this area by examining the impact of multiple aspects of adolescent alcohol and drug use on both self-reported and collateral-

reported outcomes, over and above the effects of correlated risk factors. Finally, the current study extended previous work to a high-risk sample of children of alcoholics and controls.

Results suggested that illegal drug use in adolescence had a significant negative impact on later young adult outcomes. Although this effect was small in magnitude, it is noteworthy that (for both young adult autonomy and perceived competence) the effect was unique, above and beyond correlated risk factors. Moreover, it was present for both self-reported and collateral-reported outcomes. Thus, adolescents who use illegal drugs are less autonomous and less competent in young adult positive activities. These results are consistent with Newcomb and Bentler's (1988) findings that adolescent polydrug use had negative impacts on young adult psychosocial outcomes (including mood and social relationships). The results are also consistent with Baumrind and Moselle's (1985) hypothesis that illegal drug use in adolescence negatively impacts emerging developmental competencies. As Baumrind and Moselle suggest, adolescents' use of drugs might represent a maladaptive way of coping with environmental challenges which short-circuits the development of more mature and adaptive strategies. As a result, these adolescents develop less ability to function in an autonomous and competent manner.

Also consistent with Newcomb and Bentler's (1988) findings, the current data showed a somewhat different pattern for the effects of illegal drug use and alcohol use. For illegal drug use, the effects were relatively consistent across both self-reported and collateral-reported outcomes, and illegal drug use in both adolescence and young adulthood was negatively associated with these outcomes. For heavy drinking, however, the pattern of results was more complex. In terms of both autonomy and positive activity involvement, negative effects of adolescent alcohol use were detected, but only in collateral reports of the outcome, not in participants' self-reports. Although, the current data cannot address the relative accuracy of the collaterals' perceptions compared to participants' self-evaluations, the findings do suggest that the full im-



fact of adolescent alcohol use may not be revealed in self-reports alone. Most longitudinal studies of adolescent substance use have not included multiple informant reports of outcomes, and previous reports that adolescent drinking is uncorrelated with later outcomes may have relied on self-reports of these outcomes. The current data suggest that the perspective of others may provide an important complement to self-reported outcomes.

The current data also point to the age-graded nature of heavy drinking and its different developmental implications in adolescence and young adulthood. That is, unlike the results for illegal drug use, the direction of the relation between heavy drinking and young adult outcomes differed for adolescent heavy drinking and young adult heavy drinking. Whereas heavy drinking in adolescence was associated with less positive young adult outcomes, heavy drinking in adulthood was either uncorrelated with or positively related to these outcomes. These findings suggest that heavy drinking (at least as defined by consumption of five drinks in a single sitting) may be more normative and less maladaptive in adulthood (when it is also more prevalent and more tolerated) than in adolescence.

Although not a central focus of the current paper, the analyses nevertheless yielded interesting data concerning a broader pattern of predictors of young adult positive developmental competencies. Parental factors (in this case parental alcoholism and social support) were significant predictors of later involvement in positive activities. Parents who are themselves well-functioning and supportive of their adolescents may foster adolescents' participation in positive activities both in concrete ways (e.g., seeking out these activities, participating with their adolescents, providing resources such as transportation and financial support) and in intangible ways (by providing social support and encouragement). Adolescents with higher levels of positive activity involvement and perceived competence in these activities then continue to show such involvement and competence later in young adulthood. Conversely, adolescents who show high levels of externalizing symptoms are later likely to be less involved in positive ac-

tivities and less likely to be competent at them.

Although the current study improved on previous work by considering multiple reports of young adult positive developmental outcomes, by considering the effects of correlated risk factors, and by considering the effects of both alcohol and drug use, it is also important to consider some of its limitations. First, we considered only autonomy, positive activity involvement, and perceived competence as outcomes. Other outcomes such as role occupancies and performance, social relationships, and psychopathology were not examined (see Newcomb & Bentler, 1988, and Brook et al., 1998, for data concerning these outcomes). Second, the current study examined an age-heterogeneous sample who were studied for only a 3-year period, and the study was designed to capture substance use initiation (mean age = 12.7 years at Time 1). Given the relatively young age of our subjects, our findings found little differential predictive power of the intercept and slope factors in predicting outcomes. A more comprehensive picture of substance use effects might emerge with a sample that is followed at more frequent measurement intervals over a longer adolescent period so that heavier use of alcohol and illegal drugs is more fully captured. Third, although we attempted to consider multiple aspects of alcohol and drug use, other operationalizations of frequency and quantity of use might produce different findings. Fourth, given the sample size and number of adolescent substance users, the data are not ideal for testing potential subgroup differences on the impact of adolescent substance use (e.g., gender differences, ethnic differences). Fifth, although we attempted to consider the impact of adolescent substance use above and beyond correlated risk factors, the correlational nature of our longitudinal study precludes drawing causal inferences (Leigh & Stall, 1993).

Finally, the current results have some implications for preventive interventions focused on adolescents. The fact that adolescent illegal drug use had a small but significant unique negative effect on young adult developmental competencies supports the usefulness of drug prevention efforts. Most drug

prevention programs are undertaken with the notion that they can prevent proximal negative consequences (e.g., impaired driving) or long-term drug abuse and dependence. The current data suggest an additional benefit of drug prevention for psychosocial development more broadly in terms of improved autonomy and competence. However, the fact that alcohol use effects differed for self-

ported and collateral-reported outcomes suggests that multiple reporter data will be necessary to evaluate such interventions. Finally, the current data suggest that interventions that increase parental support and parental encouragement of autonomy may produce improved developmental competence and increased involvement in positive activities.

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