

ORIGINAL ARTICLE

The Relationship Between Employment and Substance Use Among Students Aged 12 to 17

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Purpose: To examine the association between employment status and substance use among students aged 12 to 17 years.

Methods: Secondary analysis of data from the 1995 and 1996 National Household Surveys on Drug Abuse was conducted. The survey is a primary source of data on licit and illicit drug use among noninstitutionalized Americans aged 12 years or older. Participants are interviewed at their places of residence. Multiple logistic regression procedures yielded estimated associations.

Results: About one in six adolescents reported both going to school and holding a job. Approximately one-fourth of students smoked cigarettes, and one-third consumed alcohol in the past year. An estimated 1.6% of students were current heavy cigarette smokers, and 2.6% were current heavy alcohol users. One-year prevalence estimates of any illicit drug use and heavy illicit drug use were 16.7% and 1.8%, respectively. Among students employed full time, prevalence estimates increased to 9.7% for heavy cigarette smoking, 13.1% for heavy alcohol use, 38.1% for any illicit drug use, and 5.0% for heavy illicit drug use. Logistic regression analyses supported relatively high rates of cigarette use, alcohol use, illicit drug use, and heavy substance use among working students. Mental health problems, especially externalizing behavioral syndromes, were found to coexist with the use and heavy use of substances. The observed associations varied somewhat by gender.

Conclusions: The workplace may be an appropriate venue for establishing substance use prevention and early intervention programs focused on younger workers, including adolescents who work part time. © Society for Adolescent Medicine, 2003

KEY WORDS:

Adolescents
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Illicit drug use among U.S. employed adults has been well-documented [1,2], but relatively little is known about substance use among adolescents who work. The National Household Survey on Drug Abuse (NHSDA) has found a substantial number of full-time adult workers engaging in past month (i.e., current) illicit drug and heavy alcohol use [1,3,4]. Almost 6 million of an estimated 8.6 million current illicit drug users in the 1994 NHSDA, and about 6.6 million of an estimated 8.5 million heavy alcohol users, were employed full time [3]. Employee substance abuse is associated with decreased productivity, product quality, and morale, and it contributes significantly to increased health care costs, disability insurance costs, absenteeism rates, employee theft, and accidents [5,6].

NHSDA research has generally focused on descriptive studies of the relationship between substance use and employment among adults aged 18 to 49 years [1,3,4] and those aged 18 to 64 years [7]. As emphasized by Hoffmann et al. [3], the complex relationships among demographic characteristics and occupation have tended to obscure the association between any one of these factors and current

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substance use when other factors are not taken into account simultaneously. Thus, the interpretations of descriptive findings on the association between substance use and employment status are limited. Additionally, the likelihood of substance use among adolescents has been found to be associated with the severity of emotional and behavioral problems across age and gender groups [8], but mental health problems generally have not been controlled in studies examining the association between substance use and employment status [3,9,10].

The workplace is an important variable that has received little consideration in studies of high-risk youths. Holding a job has several benefits for adolescents, such as increased self-esteem, personal responsibility, and autonomy [11]. However, there is also evidence of adverse outcomes for working adolescents, including work-related injuries, poor academic performance, and substance use involvement. Particularly, adolescents have high rates of work-related injuries [11]. A study of adolescents aged 14 to 17 years found that over half of the respondents reported having been injured at least once while working at a paid job [12].

Working long hours may also affect adolescent students' academic achievement because it interferes with their ability to meet school-related demands and responsibilities (i.e., work-school conflict) [13]. Studies of adolescent students have reported an association between longer hours of work during the school year and diminished school performance, lower school engagement, and increased psychological distress or somatic complaints [14,15].

In addition, part-time work has been shown to be related to greater use of alcohol and illicit drugs and a number of deviant behaviors among high school students [9,10]. Bachman and Schulenberg [9] found a positive correlation of work intensity/hours with cigarette smoking, use of alcohol or illicit drugs, interpersonal aggression, theft, trouble with police, arguments with parents, and lack of sleep or exercise [9]. Further, Valois et al.'s study [10] suggested the need to explore potential gender variation in the relationship between employment and substance use.

In this paper, we provide national estimates of current and recent (i.e., past month and past year) substance use and examine the association of employment status with substance use separately by gender. We address two questions: (a) Is there an association between current employment status and recent substance use among adolescents? (b) Does the association between employment status and sub-

stance use remain after holding constant mental health problems and other suspected confounding influences?

Methods

Study Sample

Data used in this study came from public use files of the 1995 and 1996 NHSDAs. The NHSDA is an ongoing survey designed primarily to provide national estimates on the use of illicit drugs, alcohol, and tobacco by the U.S. civilian, noninstitutionalized population. The eligible noninstitutionalized population aged 12 years or older was selected for participation in the survey via multistage area probability sampling methods. These persons include: (a) household residents; (b) residents of noninstitutional group quarters, such as college dormitories, group homes, shelters, and rooming houses; and (c) civilians dwelling on military installations. Youths, Blacks, and Hispanics were oversampled to improve the precision of estimates for them. Although the sample design has changed over time, it has been representative of the U.S. general population for civilian, noninstitutionalized persons aged 12 years or older [16,17].

To enhance candid reporting, the NHSDA in 1995 and 1996 used self-administered answer sheets for questions about the use of various drugs, opinions about drugs, and problems associated with drug use. High response rates for the whole sample were achieved: 81% and 79% for the 1995 and 1996 NHSDAs, respectively. Response rates for three racial/ethnic groups (i.e., Blacks, Hispanics, and Whites/others) ranged from 80% to 83% in 1995, and from 77% to 81% in 1996. Other details of the survey design and data collection procedures are reported elsewhere [16,17]. A total of 4595 [16] and 4538 [17] adolescents aged 12 to 17 years completed in-home interviews ($N = 9133$). We used the 1995 and 1996 NHSDA data files because they included assessments of adolescent mental health, whereas the 1997 and more recent NHSDAs did not collect this information.

Definition of Variables

We categorized adolescents on the basis of both *school* and *work status*. Among this community sample of school-aged youths, nearly all reported that they were going to school (96.9%; $n = 8790$), and these are the focus of our analyses. Among the

students, 83.5% ($n = 7541$) were in school only (i.e., not working), 14.4% ($n = 1077$) worked part time (i.e., < 35 hours per week), 1.3% ($n = 96$) worked full time (i.e., ≥ 35 hours per week), and 0.8% ($n = 76$) described themselves as unemployed, laid off, or full-time homemakers. The most common nonhome places of youth employment were retail stores, restaurants, construction sites, and grocery stores [12]. Thus, about one adolescent in six was self-described as both working and going to school, about 87% of whom had a part-time job. The assessment item used to define present employment status was consistent with that used in NHSDA reports [1,2,16,17].

The NHSDA includes assessments of lifetime, past year, and past month use of the following substances: alcohol, tobacco, marijuana, cocaine/crack, hallucinogens, heroin, inhalants, and the nonmedical use of prescription drugs (i.e., analgesics or pain relievers, sedatives, tranquilizers, and stimulants). To reduce possible reporting errors and recall biases somewhat, our investigation focused on *recent (past year)* and *current (past month)* use. We examined two mutually exclusive groups of illicit drug users based on the specific drugs used [18,19]: (a) only marijuana use (i.e., includes adolescents who reported using "only marijuana" in the past year) and (b) illicit drug use, excluding marijuana use only. The latter group includes adolescents who reported any use of at least one of the following substances in the past year: cocaine/crack, inhalants, hallucinogens, heroin, and nonmedical use of psychotherapeutics; it excludes all adolescents who had used only marijuana in the past year.

We also differentiated between *any* use and *heavy* use. *Heavy cigarette smoking* is defined as smoking one pack or more each day in the past 30 days [20]. *Binge alcohol use* refers to having consumed five or more drinks per occasion on 1 or more days in the previous 30 days [16]. *Heavy alcohol use* refers to having consumed five or more drinks per occasion on 5 or more days in the previous 30 days [16]. *Heavy drug use* includes meeting at least one of the following three criteria in the past year [21]: (a) using marijuana daily or more often; (b) using cocaine, hallucinogens, inhalants, pain relievers, sedatives, tranquilizers, or stimulants weekly or more often; or (c) using heroin at least once.

Questions on the *mental health* of adolescents were adopted from problem items found in the Youth Self-Report Checklist (YSR) [22]. The YSR was designed to assess the emotional and behavioral problems of adolescents aged 11 to 18 years in a standardized format, covering the psychological functioning

of adolescents during the preceding 6-month period. Consistent with Achenbach [22], the *externalizing behavioral* scale measures overt behavioral problems and combines scores on the aggressive and delinquent behavior subscales [8]. The *internalizing emotional* scale summarizes emotional problems and combines scores on the withdrawn, somatic complaints, and anxious/depressed subscales [8]. For all scales, the cutoff point of the severity was determined by values recommended by Achenbach [22].

Other demographic variables examined in this study include gender, race/ethnicity, age, family receiving public assistance, geographic region of residence, and urbanicity. *Receiving public assistance* refers to receipt by the respondent or other family members of public assistance in the past year (e.g., social security or railroad retirement payments, supplemental security income, aid to families with dependent children, child support payments, food stamps, Medicaid, or welfare payments). *Geographic region of residence* was categorized into Northeast, North Central, South, and West in conformity with 1990 census specifications. *Urbanicity* included "urban" (i.e., census segments in a metropolitan statistical area [MSA]) and "rural" (i.e., census segments not in an MSA).

Data Analyses

Because the NHSDA data were obtained from multistage sampling, the estimates were weighted to adjust for differential probabilities of selection. Estimates for substance use and heavy use were generated separately for each survey year and in aggregate, then the association between work status and substance use was examined. Consistent with prior studies [23–25], we found that adolescents who reported not being enrolled in school had higher rates of using cigarettes, alcohol, and any illicit drugs than those enrolled in school. Because the inclusion of these youths in the analysis sample may obscure the relationship between employment and substance use, and because school dropouts represent only 3.1% of all adolescents aged 12 to 17 years, we excluded them from logistic regression analyses, resulting in a sample of 8790. SUDAAN software [26], which applies a Taylor series linearization method to account for complex design features of the NHSDA, was used for statistical analysis.

Results

Table 1 presents the social and demographic characteristics of adolescents aged 12 to 17 years who were

Table 1. Social and Demographic Characteristics of Youths Aged 12 to 17 Years, 1995 and 1996 National Household Surveys on Drug Abuse (Unweighted $N = 9133$)

	1995 NHSDA (%)	1996 NHSDA (%)
Age (years)		
12–14	50.9	49.6
15–17	49.1	50.4
Gender		
Male	51.1	51.3
Female	48.9	48.8
Race/ethnicity		
Whites, non-Hispanic	68.2	67.7
Blacks, non-Hispanic	14.5	14.6
Hispanics	12.6	12.9
Others ^a	4.7	4.8
Total family income		
\$0–\$19,999	23.9	22.7
\$20,000–\$39,999	29.8	29.4
>\$40,000	46.3	47.9
Family receiving public assistance		
Yes	41.4	41.2
No	58.7	58.8
Current employment		
Full-time	2.2	1.6
Part-time	15.3	14.8
Unemployed	2.4	2.0
In school only	80.2	81.6
Geographic region of residence		
Northeast	17.5	16.6
North Central	25.7	26.1
South	33.2	35.3
West	23.6	22.1

^a Others include Asians, Pacific Islanders, American Indians, and Alaska Natives.

interviewed in the 1995 and 1996 NHSDAs. There was no variation between the two surveys in the characteristics compared, which were age, gender, race/ethnicity, total family income, family receiving public assistance, employment status, school enrollment, and geographic region of residence.

Additional analyses of the combined 1995 and 1996 data revealed that youths' work status is related to age and school status. Among students aged 15 to 17 years, 28.5% reported working full time or part time compared with 3.7% of students aged 12 to 14 years. Higher proportions of working or unemployed youths were noted among *school dropouts* (i.e., those aged 12 to 17 years who reported not being enrolled in school, $N = 343$), of whom 19.6% reported full-time work, 34.4% reported part-time work, and 46.0% identified themselves as unemployed or laid off (data not shown).

Exploratory analyses found that students working full time were likely to be older (82% aged 16 and 17

years), male (65%), non-Hispanic white (56%), living in large metropolitan areas (i.e., MSAs with 250,000 or more persons, 69%), from a family with three or more persons (77%), and residents of the South (38%) or North Central (28%) region (data not shown). All students working full time reported a personal income of less than \$20,000 per year, 18% reported symptom patterns consistent with internalizing emotional syndromes, and 19% reported symptom patterns consistent with externalizing behavioral syndromes.

Prevalence of Recent and Current Substance Use

Table 2 summarizes substance use prevalence estimates from the 1995 and 1996 NHSDAs for all youths aged 12 to 17 years ($N = 9133$), for youths who reported being enrolled in school (i.e., students, $n = 8790$), and for school dropouts ($n = 343$). Approximately one-fourth of students smoked cigarettes, and one-third consumed alcohol in the past year. Among students, past year prevalence estimates for marijuana use only, any illicit drug use (excluding marijuana only), and heavy illicit drug use were 7.7%, 9.0%, and 1.8%, respectively. The past month prevalence estimates of *heavy* use for students were 1.6% for heavy cigarette smoking, 6.9% for binge alcohol use, and 2.6% for heavy alcohol use.

Recent substance use was quite common among school dropouts (Table 2). More than one-half of school dropouts had used alcohol and/or cigarettes recently. Relative to the rates among students, school dropouts had higher rates of illicit drug use and heavy use of alcohol, cigarettes, and illicit drugs. About 16.8% of students used any illicit drug in the past year, while 37.3% of school dropouts did so. Only 1.6% of students were current heavy cigarette smokers compared with 13.1% of school dropouts. Similarly, just 1.8% of students were heavy drug users, while 12.9% of school dropouts reported heavy drug use.

As shown in Figures 1 and 2, relatively high rates of cigarette smoking, alcohol use, any illicit drug use, heavy cigarette smoking, binge alcohol use, and heavy alcohol use were noted among working (part-time or full-time) and unemployed students. There was a significant bivariate association between each substance examined and work status ($p \leq .001$).

An estimated 21.5% of students working full time, 13.4% of students working part time, and 12.8% of unemployed students used marijuana only in the preceding year relative to 6.4% of those in school only ($\chi^2 = 47.1$, $df = 3$, $p < .001$). Prevalence

Table 2. Prevalence Estimates of Substance Use in the Past Year: 1995 and 1996 National Household Surveys on Drug Abuse, Youths Aged 12 to 17 years (Unweighted N = 9133)

Substance Use in the Past Year	1995 (%)	1996 (%)	1995-1996 ^a Students (%)	1995-1996 ^b School Dropouts (%)
Cigarette smoking				
Yes	26.6	24.2	24.5	53.0
No	73.4	75.8	75.5	47.0
Alcohol use				
Yes	35.1	32.7	33.0	61.1
No	64.9	67.3	67.0	38.9
Only marijuana use				
Yes	8.3	7.5	7.7	13.6
No	91.7	92.5	92.3	86.4
Any illicit drug use, excluding marijuana only				
Yes	9.7	9.3	9.0	23.6
No	90.3	90.8	91.0	76.4
Heavy cigarette smoking				
Yes	1.9	1.9	1.6	13.1
No	98.1	98.1	98.4	86.9
Binge alcohol use				
Yes	7.7	7.0	6.9	21.7
No	92.3	93.0	93.1	78.3
Heavy alcohol use				
Yes	2.7	2.9	2.6	9.6
No	97.3	97.3	97.4	90.4
Heavy drug use				
Yes	2.4	1.9	1.8	12.9
No	97.6	98.1	98.2	87.1

^a "Students" include youths aged 12 to 17 years who identified themselves as students and exclude school dropouts (n = 8790).

^b "School dropouts" refer to youths aged 12 to 17 years who reported not being enrolled in school (n = 343).

estimates for any illicit drug use, excluding marijuana only, were 16.6% for students working full time, 14.2% for students working part time, 24.4% for unemployed students, and 7.9% for students in school only ($\chi^2 = 36.1, df = 3, p < .001$). Similarly, currently working or unemployed students had higher rates of heavy substance use than nonworking students. The crude odds ratios for students working full time versus those in school only were 8.9 for heavy cigarette smoking, 5.3 for binge alcohol use, and 7.7 for heavy alcohol use.

Because older students typically had higher proportions of substance use and work than younger students, descriptive analyses were conducted to explore the association between work status and substance use by age group. The pattern of substance use and heavy use by work status among all students aged 12 to 17 years was generally similar to the pattern observed for older students aged 15 to 17 years. Among these older students, significant bivariate associations were found between work status and each of the substance use and heavy use outcomes. Among younger students aged 12 to 14 years,

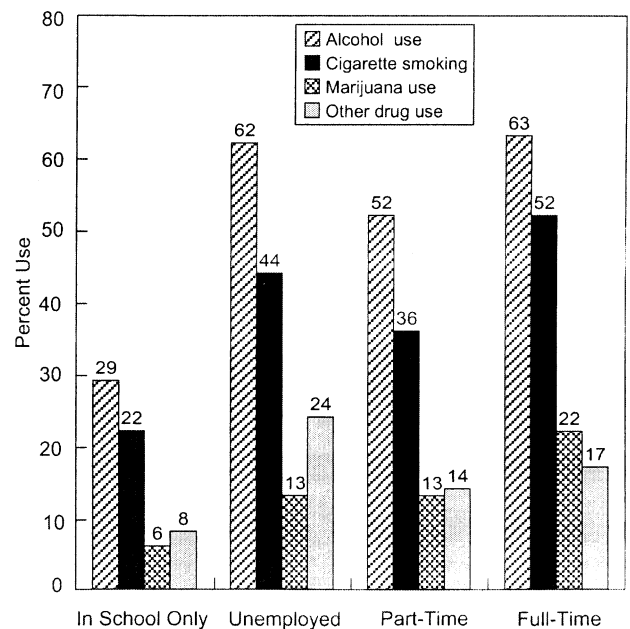


Figure 1. Prevalence of Substance Use Among Students Aged 12 to 17 Years, by Work Status. (Note: These 1-Year Prevalence Estimates Are Descriptive and Do Not Control for Any Variables.)

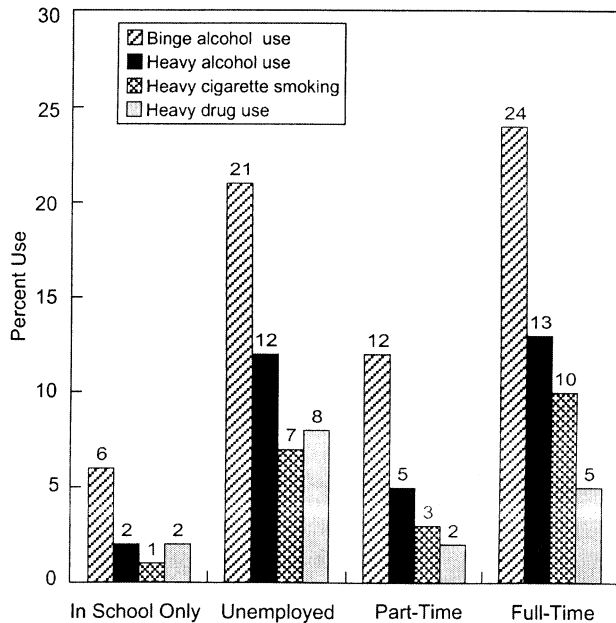


Figure 2. Prevalence of Heavy Substance Use Among Students Aged 12 to 17 Years, by Work Status. (Note: Heavy Drug Use Refers to 1-Year Prevalence Estimates; all Others Are 1-Month Prevalence Estimates. These Estimates are Descriptive and Do Not Control for Any Variables.)

those employed fulltime in comparison with those enrolled in school only had higher rates of illicit drug use other than marijuana, heavy alcohol use, and heavy drug use.

Work Status and Other Suspected Determinants for Substance Use

Tables 3 and 4 present adjusted odds ratio (aOR) estimates for substance use and heavy use in relation to work status and other suspected determinants among youths enrolled in school. School dropouts were excluded from these analyses. The aOR estimates are derived from logistic regression procedures that constrain the potentially distorting influence of all other sociodemographic variables listed in the table. These models were conducted separately by gender.

Substance use. With statistical adjustment for age, race/ethnicity, and the other variables (Table 3), male students working full time and female students working part time had higher rates of cigarette smoking than youths in school only. Although work status was not associated with alcohol use among males, working full time, working part time, or being unemployed were found to be associated with in-

creased odds of alcohol use among female students. Among males, working either full time or part time was associated with increased odds of using marijuana only, and being unemployed was associated with using other illicit drugs. Among females, working part time was observed to have increased odds of using other illicit drugs relative to being in school only.

We also found that: (a) being aged 15 to 17 years, relative to being aged 12 to 14 years, predicted increased odds of using cigarettes, alcohol, and illicit drugs; (b) Whites generally had higher rates of cigarette smoking, alcohol use, and illicit drug use, excluding marijuana use only, than nonwhites; and (c) students in families receiving public assistance were at increased odds of using cigarettes and marijuana. Further, externalizing behavioral syndromes were noted to be associated with increased odds of cigarette use, alcohol use, and illicit drug use for all students, while internalizing emotional syndromes predicted increased rates among only females (e.g., cigarette smoking, alcohol use, and illicit drug use, excluding marijuana use only).

Heavy substance use. As shown in Table 4, male students working full time compared with those in school only had approximately a threefold to fourfold excess in heavy cigarette smoking, binge drinking, and heavy drinking. Being unemployed also was associated with increased odds of current heavy cigarette smoking among male students. Among female students, working part time and, particularly, being unemployed predicted increased odds of binge and heavy drinking.

In addition, older students (aged 15 to 17 years) were more likely than younger students to smoke cigarettes daily and to binge drink. Older male students tended to have used alcohol more heavily than younger male students, and older female students tended to have used illicit drugs more heavily than younger female students. Black and Hispanic females were significantly less likely to smoke cigarettes daily than white females. Regardless of gender, Blacks, relative to Whites, had a lower rate of binge drinking. Black males also had a lower rate of heavy alcohol drinking than white males. For all students, a family's receipt of public assistance predicted increased odds of heavy cigarette smoking, and externalizing behavioral syndromes were associated with increased odds of all heavy use outcomes. Internalizing emotional syndromes were not associated with any heavy use outcome in the adjusted model.

Table 3. Adjusted Odds Ratio (aOR) of Past Year Substance Use Among Students Aged 12 to 17 Years: 1995 and 1996 National Household Surveys on Drug Abuse (Unweighted N = 8790)

Characteristic	Cigarette Smoking aOR (95% CI)		Alcohol Use aOR (95% CI)		Only Marijuana Use aOR (95% CI)		Any Drug Use, Excluding Marijuana Only aOR (95% CI)	
	Males	Females	Males	Females	Males	Females	Males	Females
Employment								
Working full-time	2.0 (1.2–3.3)*	—	—	2.9 (1.1–8.0)*	2.6 (1.2–5.5)*	—	—	—
Working part-time	—	1.5 (1.2–2.0)***	—	1.6 (1.3–2.0)***	1.4 (0.9–2.0)*	—	—	1.5 (1.0–2.1)*
Unemployed (ref. in school only)	—	—	—	3.2 (1.0–9.9)*	—	—	4.2 (1.6–11.0)**	—
Age 15–17 years (ref. 12–14 years)	2.7 (2.3–3.2)***	2.4 (1.8–3.1)***	4.4 (3.6–5.5)***	4.4 (3.5–5.6)***	3.6 (2.7–4.9)***	4.1 (2.5–6.7)***	1.9 (1.4–2.7)***	2.0 (1.4–2.7)***
Race/ethnicity								
Black	0.4 (0.3–0.6)***	0.3 (0.2–0.3)***	0.6 (0.5–0.8)***	0.5 (0.4–0.6)***	—	—	0.5 (0.3–0.7)***	0.3 (0.2–0.5)***
Hispanic	0.7 (0.5–0.9)**	0.4 (0.3–0.5)***	—	0.8 (0.6–0.9)*	—	—	—	0.5 (0.4–0.8)**
Other (ref. white)	0.5 (0.2–0.9)*	—	—	—	0.2 (0.1–0.7)*	—	—	—
Public assistance (ref. no)	1.6 (1.3–1.9)*	1.6 (1.3–2.0)***	—	—	1.5 (1.1–1.9)**	1.5 (1.1–2.0)**	—	—
Region								
Northeast	—	—	—	—	—	—	—	0.5 (0.4–0.8)*
North central	1.6 (1.1–2.3)*	—	—	—	—	—	—	—
South (ref. west)	—	1.4 (1.1–1.7)*	—	—	—	—	—	—
Rural segment (ref. urban)	—	0.8 (0.6–1.0)*	—	—	—	—	0.7 (0.5–1.0)*	—
Internalizing syndrome (ref. no)	—	1.4 (1.1–1.8)*	—	1.3 (1.0–1.8)*	—	—	—	1.6 (1.1–2.2)**
Externalizing syndrome (ref. no)	3.3 (2.5–4.3)***	4.2 (3.3–5.3)***	3.4 (2.5–4.5)***	3.9 (3.1–4.9)***	1.8 (1.3–2.6)**	2.5 (1.6–3.8)***	6.4 (4.2–9.7)***	5.2 (3.6–7.4)***

* $p \leq .05$; ** $p \leq .01$, *** $p \leq .001$. These estimates are based on separate logistic regression models for each class of substance use, adjusting for the other variables listed in the table and the year of survey.

Ref. = reference group; aOR = estimated adjusted odds ratio; 95% CI = 95% confidence interval.

Discussion

This study found an association between being employed and increased rates of recent substance use and heavy use among adolescent students, with or without statistical adjustment for sociodemographic characteristics, mental health syndromes, and year of survey. To summarize, as compared with *male* students in school only, we found *increased rates* of: (a) cigarette smoking, marijuana use only, heavy cigarette smoking, binge alcohol use, and heavy alcohol use among male students working full time; (b) marijuana use only among males working part time; and (c) other illicit drug use and heavy cigarette smoking among unemployed male students. Relative to *female* students in school only, we found *increased rates* of: (a) alcohol use among females

working full time; (b) cigarette smoking, alcohol use, other illicit drug use, binge alcohol use, and heavy alcohol use among female students working part time; and (c) alcohol use, binge alcohol use, and heavy alcohol use among unemployed female students.

For all students, older students (aged 15 to 17 years) had higher rates of recent use of cigarettes, alcohol, illicit drugs, heavy cigarette smoking, and binge alcohol use than younger students (aged 12 to 14 years). White, non-Hispanic students generally had higher rates of cigarette smoking, alcohol use, and other drug use than nonwhite students. Students in families receiving any form of public assistance tended to smoke cigarettes, use marijuana, or smoke cigarettes daily.

Table 4. Adjusted Odds Ratio (aOR) of Heavy Substance Use Among Students Aged 12 to 17 Years: 1995 and 1996 National Household Surveys on Drug Abuse (Unweighted N = 8790)

Characteristic	Heavy Cigarette Smoking ^a aOR (95% CI)		Binge Alcohol Use ^a aOR (95% CI)		Heavy Alcohol Use ^a aOR (95% CI)		Heavy Drug Use ^b aOR (95% CI)	
	Males	Females	Males	Females	Males	Females	Males	Females
Employment								
Working full-time	3.5 (1.1–11.8)*	—	2.6 (1.4–4.9)**	—	3.7 (1.8–7.6)***	—	—	—
Working part-time	—	—	—	1.8 (1.2–2.7)**	—	3.0 (1.5–6.0)**	—	—
Unemployed (ref. in school only)	4.3 (1.0–18.8)*	—	—	3.9 (1.6–9.3)**	—	12.2 (3.7–40.8)***	—	—
Age 15–17 years (ref. 12–14 years)	11.1 (4.4–27.8)***	2.8 (1.7–6.8)*	5.4 (3.8–7.6)***	3.1 (1.9–5.0)***	4.9 (2.8–8.5)***	—	—	2.0 (1.1–3.7)*
Race/ethnicity								
Black	—	0.1 (0.04–0.6)**	0.3 (0.2–0.5)***	0.3 (0.2–0.6)***	0.2 (0.1–0.4)***	—	—	—
Hispanic	—	0.11 (0.1–0.3)***	—	—	—	—	—	—
Other (ref. white)	—	—	—	—	—	—	—	—
Public assistance (ref. no)	1.9 (1.1–3.5)*	3.69 (1.7–7.8)***	—	—	—	—	—	—
Region								
Northeast	—	—	—	—	—	—	0.3 (0.1–0.9)*	—
North central	—	—	—	—	—	—	—	—
South (Ref. west)	—	—	—	—	2.1 (1.2–3.7)**	—	0.4 (0.2–0.9)*	—
Rural segment (ref. urban)	—	—	—	—	—	—	—	—
Internalizing syndrome (ref. no)	—	—	—	—	—	—	—	—
Externalizing syndrome (Ref. no)	3.1 (1.7–5.7)***	6.8 (3.0–15.2)***	3.6 (2.5–5.2)***	4.1 (2.8–6.1)***	3.5 (2.1–5.7)***	3.1 (1.8–5.5)***	7.9 (3.7–16.6)***	5.9 (3.3–10.5)***

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$. These estimates are based on separate logistic regression models for each class of substance use, adjusting for the other variables listed in the table and the year of survey.

^a In the past month.

^b In the past year.

Ref = reference group; aOR = estimated adjusted odds ratio; 95% CI = 95% confidence interval.

Consistent with previous studies of adults [1,3] and adolescents [9,10,27], employment was found to be associated with increased rates of substance use. In addition, this relationship remains even after we excluded school dropouts from statistical analyses and statistically adjusted for sociodemographic characteristics and the presence of mental health syndromes. There also was gender variation in the association of substance use with mental health syndromes. The internalizing emotional syndrome was associated with increased odds of substance use among female, but not male, adolescents. In comparison, the externalizing behavioral syndrome (e.g., aggressive and/or delinquent behaviors) was found

to be a consistent correlate of all substance use and heavy outcomes for all students. These findings suggest co-occurring aggressive and/or delinquent behaviors with the use of substances among adolescents [28]. They also lend additional support to the Problem Behavior Theory [29,30], which suggests the clustering of substance use behaviors with other health risk behaviors.

The association between substance use and the internalizing emotional syndrome for females is consistent with a self-medication hypothesis [31], which suggests that individuals may use alcohol or cigarettes to self-medicate their internal distress. However, the finding for males is inconsistent with this

hypothesis. Studies of comorbidity have typically focused on the association of psychiatric with substance use disorders [32–35]. Because substance use, heavy use, or dependence may each be related to comorbid conditions in an entirely different way, our findings suggest the need for further investigation of the co-occurring mental health syndromes with substance use among adolescents, as well as a study of gender differences in the co-occurrence.

There are several potential explanations for the link between being employed and increased substance use among adolescents. *First*, working adolescents are likely to have higher exposure to others (e.g., older coworkers) who use cigarettes, alcohol, or other drugs. Young people exposed to others who use substances are at higher risk for early initiation [36]. Mortimer et al. [37] suggested that students who were more invested in work might develop friendships with older fellow workers, who in turn initiated them into more adult-like patterns of recreation. Additionally, adolescents at work may have increased opportunities to try substances (e.g., being offered the chance to try them). The opportunity to try illicit drugs has been shown to be associated with initial use of drugs [38].

Second, heavy time commitment to employment may be seen as an important symptom of a potentially wide range of psychosocial difficulties [9]. Some investigators [9,37] suggested that the association of employment with drug use or other problem behaviors among adolescents might be related partly to their mental health or school adjustment problems. For instance, Bachman and Schulenberg [9] found that students who had poorer grades, had been held back, or did not plan to complete college were more likely than their peers without such characteristics to work long hours in part-time jobs. The investigators suggested that students with a history of poorer performance and less interest in school were willing to commit long hours to employment while still enrolled in school. A study of ninth graders found that prior alcohol use predicted increased work hours subsequently, although earlier mental health was not associated with subsequent work hours [37].

Third, for some students, the greater rate of substance use among working adolescents might be attributed to increased disposable income [37]. Data from a national survey showed that most money earned through adolescent part-time work was used as disposable income by adolescents [39]. Mortimer et al. [37] suggested that adolescents who were already frequent users of alcohol or other substances

could be motivated by the financial gain derived from the intensity of work to support their substance use. Because of a positive correlation between earnings and work intensity [37], further investigations should explore their relative contributions to substance use and whether their relationship with substance use depends on the working context (e.g., the type and quality of work). *Fourth*, the use of alcohol or other substances might also be related to stress from work. A study of 10th to 11th graders found a significant correlation between exposure to job stress (e.g., poor environmental conditions, poor organizational structure, or conflict of work with other roles) and the use of alcohol or marijuana [40].

As with prior epidemiologic studies on substance use, one of the main limitations of this type of research is its use of self-reported data, which are subject to recall and reporting biases [41]. Nonetheless, Winters et al.'s study [42] demonstrated that the great majority of teenagers who were interviewed in drug clinic and school settings gave temporally consistent reports of substance use involvement and that only a small proportion of them presented extreme response bias tendencies. An analysis of survey data also indicated that adolescent self-reports of substance use were generally reliable and valid [43]. Another limitation is that the cross-sectional nature of this study does not allow us to make causal inferences regarding the observed relationship. The lack of detailed information in the NHSDA about numbers of hours of work, reasons for work, and school performance limits our ability to examine these issues. The NHSDA questions about work status are specified as "working full time, 35 hours or more a week" or "working part time, less than 35 hours a week."

Moreover, the reported proportion of working adolescents in the NHSDA is lower than in other studies, such as the Monitoring the Future, the National Longitudinal Survey of Youth, the National Longitudinal Study of Adolescent Health, and the National Education Longitudinal Survey, all of which found much larger proportions of youths working full- or part-time while in school (i.e., between 40% and 80%) [11]. Nonetheless, our rates of employment among the 16-year-olds (31.2%) and 17-year-olds (44.1%) were consistent with those of the Bureau of Labor Statistics [44], which reported that 34.5% of 16- and 17-year-olds were employed at any given time during 1996. The age-specific proportions of youths who reported working were found to be consistent across the 1995 and 1996 NHSDAs. We also examined the employment rate in the youth

sample of the 1998 NHSDA and found similar estimates.

The diverse methodologies used in prior studies make the comparison of reported proportions of employed youths across studies difficult. These include differences in sample characteristics, the detail of employment questions, the reference period employed, and whether informal work (e.g., babysitting) or unpaid work is considered as work [11,45].

Notwithstanding such limitations, the findings reported here add important epidemiological information about the association between work status and recent *heavy* substance use among adolescents based on a nationally representative, community sample. The consequences and burdens associated with substance use among adolescents are enormous, such as a reduced rate of high school completion, reduced expected future earnings, potential health problems, and increased risk for later psychiatric and drug use disorders [17,46,47].

These findings have implications for targeting prevention efforts at adolescents. First, school-based substance use prevention programs should emphasize cessation of current use as well as prevention of first use (i.e., both primary and secondary prevention), and working students need greater attention for prevention. Second, the workplace may be an appropriate venue for establishing substance use prevention and early intervention programs focused on younger workers. These programs should also be extended to target adolescents who work part time. Finally, these data suggest the need for pediatricians and other health care providers to screen their adolescent patients, particularly those who work, for substance use and potential coexisting mental health problems, and to refer those who screen positive to appropriate behavioral health care services.

The causal dynamics underlying the association between employment and substance use remain to be definitely identified. Working *per se* is not deleterious to adolescents. Future research should examine the characteristics and processes related to employment that put adolescents at risk for initial substance use or maintaining their use. These include such factors as the perceived meaning of adolescent work, the societal context of the workplace, the characteristics and the quality of work, the time spent in the workplace, and the effects of family, peer group, and school contexts.

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References

- Zhang Z, Huang LX, Brittingham AM. Worker Drug Use and Workplace Policies and Programs: Results from the 1994 and 1997 National Household Survey on Drug Abuse. Rockville, MD: Office of Applied Studies, 1999. (DHHS Pub. No. SMA 99-3352, analytic series A-11.)
- Cook RF. Drug use among working adults: Prevalence rates and estimation methods. In: Gust SW, Walsh JM (eds). *Drugs in the Workplace: Research and Evaluation Data*. Rockville, MD: National Institute on Drug Abuse, 1989:17-32. (DHHS publication ADM 89-1612, NIDA research monograph 91.)
- Hoffmann JP, Larison C, Sanderson A. An Analysis of Worker Drug Use and Workplace Policies and Programs. Rockville, MD: Office of Applied Studies, 1997. (DHHS publication SMA 97-3142, analytic series A-2.)
- Hoffmann JP, Brittingham A, Larison C. Drug Use Among U.S. Workers: Prevalence and Trends by Occupation and Industry Categories. Rockville, MD: U.S. Department of Health and Human Services, 1996.
- U.S. Department of Labor. Working Partners for an Alcohol- and Drug-Free Workplace. Saving Life and Money: Solving Substance Abuse in the Workplace. Washington, DC: U.S. Department of Labor, 1998.
- Galvin DM. Workplace managed care: Collaboration for substance abuse prevention. *J Behav Health Serv Res* 2000;27:125-30.
- Townsend TN, Lane JD, Dewa CS, et al. Substance Use and Mental Health Characteristics by Employment Status. Rockville, MD: Office of Applied Studies, 1999. (DHHS Pub. No. SMA 99-3311, analytic series A-10.)
- Ragin A, Rasinski KA, Cerbone FG, et al. The Relationship Between Mental Health and Substance Abuse Among Adolescents. Rockville, MD: Office of Applied Studies, 1999. (DHHS Pub. No. SMA 99-3286, analytic series A-9.)
- Bachman JG, Schulenberg J. How part-time work intensity relates to drug use, problem behavior, time use, and satisfaction among high school seniors: Are these consequences or merely correlates? *Dev Psychol* 1993;29:220-35.
- Valois RF, Dunham AC, Jackson KL, et al. Association between employment and substance abuse behaviors among public high school adolescents. *J Adolesc Health* 1999;25:256-63.
- Institute of Medicine. Protecting Youth at Work: Health, Safety, and Development of Working Children and Adolescents in the United States, (chapters 2 and 7). Washington, DC: Committee on the Health and Safety Implications of Child Labor, National Research Council and Institute of Medicine, 1998.
- Dunn KA, Runyan CW, Cohen LR, et al. Teens at work: A statewide study of jobs, hazards, and injuries. *J Adolesc Health* 1998;22:19-25.
- Steinberg LD, Cauffman E. The impact of employment on adolescent development. *Ann Child Dev* 1995;11:131-66.
- Markel KS, Frone MR. Job characteristics, work-school conflict, and school outcomes among adolescents: Testing a structural model. *J Appl Psychol* 1998;83:277-87.
- Steinberg LD, Dornbusch SM. Negative correlates of part-time employment during adolescence: Replication and elaboration. *Dev Psychol* 1991;27:304-13.

16. Office of Applied Studies. National Household Survey on Drug Abuse: Main Findings 1995. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1997. (DHHS Pub. No. SMA 97-3127, NHSDA series H-1.)
17. Office of Applied Studies. Preliminary Results from the 1996 National Household Survey on Drug Abuse. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1997. (DHHS Pub. No. SMA 97-3149, NHSDA series H-3.)
18. Office of Applied Studies. National Household Survey on Drug Abuse: Main Findings 1996. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1998. (DHHS Pub. No. SMA 98-3200, NHSDA series H-3.)
19. Office of Applied Studies. Summary of the Findings from the 1998 National Household Survey on Drug Abuse. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1999. (DHHS Pub. No. SMA 99-3328, NHSDA series H-3.)
20. Office of Applied Studies. Substance Use Among Women in the United States. Rockville, MD: Substance Abuse and Mental Health Services Administration, 1997. (DHHS Pub. No. SMA 97-3162, analytic series A-3.)
21. Epstein JF, Gfroerer JC. Estimating substance abuse treatment need from a national household survey. In: *Analyses of Substance Abuse and Treatment Need Issues*. Rockville, MD: Office of Applied Studies, 1998:113–25. (DHHS Pub. No. SMA 98-3227, analytic series A-7.)
22. Achenbach TM. *Manual for the Youth Self-Report and 1991 Profile*. Burlington, VT: University of Vermont, 1991.
23. Yamada T, Kendix M, Yamada T. The impact of alcohol consumption and marijuana use on high school graduation. *Health Econ* 1996;5:77–92.
24. Escobedo LG, Peddicord JP. Long-term trends in cigarette smoking among young U.S. adults. *Addict Behav* 1997;22:427–30.
25. Bray JW, Zarkin GA, Ringwalt C, et al. The relationship between marijuana initiation and dropping out of high school. *Health Econ* 2000;9:9–18.
26. Shah BV, Barnwell BG, Bieler GS. *SUDAAN Software for the Statistical Analysis of Correlated Data*. Research Triangle Park, NC: Research Triangle Institute, 1996.
27. Miller DS, Miller TQ. A test of socioeconomic status as a predictor of initial marijuana use. *Addict Behav* 1997;22:479–89.
28. DuRant RH, Smith JA, Kreiter SR, et al. The relationship between early age of onset of initial substance use and engaging in multiple health risk behaviors among young adolescents. *Arch Pediatr Adolesc Med* 1999;153:286–91.
29. Jessor R. Problem-behavior theory, psychosocial development, and adolescent problem drinking. *Br J Addict* 1987;82:331–42.
30. Jessor R. Risk behavior in adolescence: A psychosocial framework for understanding and action. *J Adolesc Health* 1991;12: 597–605.
31. Khantzian EJ. The self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *Am J Psychiatry* 1985;142:1259–64.
32. Regier DA, Farmer ME, Rae DS, et al. Comorbidity of mental disorders with alcohol and other drug abuse: Results from the Epidemiologic Catchment Area (ECA) Study. *JAMA* 1990;264: 2511–8.
33. Grant BF, Harford TC. Comorbidity between DSM-IV alcohol use disorders and major depression: Results of a national survey. *Drug Alcohol Depend* 1995;39:197–206.
34. Kessler RC, Nelson CB, McGonagle KA, et al. The epidemiology of co-occurring addictive and mental disorders: Implications for prevention and service utilization. *Am J Orthopsychiatry* 1996;66:17–31.
35. Kandel DB, Johnson JG, Bird HR, et al. Psychiatric comorbidity among adolescents with substance use disorders: Findings from the MECA Study. *J Am Acad Child Adolesc Psychiatry* 1999;38:693–9.
36. Kosterman R, Hawkins JD, Guo J, et al. The dynamics of alcohol and marijuana initiation: Patterns and predictors of first use in adolescence. *Am J Public Health* 2000;90:360–6.
37. Mortimer JT, Finch MD, Ryu S, et al. The effects of work intensity on adolescent mental health, achievement, and behavioral adjustment: New evidence from a prospective study. *Child Dev* 1996;67:1243–61.
38. Van Etten ML, Neumark YD, Anthony JC. Male-female differences in the earliest stages of drug involvement. *Addiction* 1999;94:1413–9.
39. Bachman JG. Do high school students earn too much money? *Econ Outlook USA* 1983;10:64–7.
40. Greenberger E, Steinberg LD. Adolescents who work: Health and behavioral consequences of job stress. *Dev Psychol* 1981; 17:691–703.
41. Gfroerer J, Brodsky M. The incidence of illicit drug use in the United States, 1962–1989. *Br J Addict* 1992;87:1345–51.
42. Winters KC, Stinchfield RD, Henly GA, Schwartz RH. Validity of adolescent self-report of alcohol and other drug involvement. *Int J Addict* 1990–91;25:1379–95.
43. Needle R, McCubbin H, Lorence J, et al. Reliability and validity of adolescent self-reported drug use in a family-based study: A methodological report. *Int J Addict* 1983;18:901–12.
44. Bureau of Labor Statistics. *Employment and Earnings, January 1997*. Washington, DC: US Department of Labor, 1997.
45. Kablaoui BN, Pautler A. The effects of part-time work experience on high school students. *J Career Dev* 1991;17:195–211.
46. Kandel DB, Johnson JG, Bird HR, et al. Psychiatric disorders associated with substance use among children and adolescents: Findings from the Methods for the Epidemiology of Child and Adolescent Mental Disorders (MECA) Study. *J Abnorm Child Psychol* 1997;25:121–32.
47. Lewinsohn PM, Rohde P, Brown RA. Level of current and past adolescent cigarette smoking as predictors of future substance use disorders in young adulthood. *Addiction* 1999;94:913–21.