

Early Alcohol Use, Rural Residence, and Adult Employment*

MICHAEL MINK, PH.D., JONG-YI WANG, PH.D.,[†] KEVIN J. BENNETT, PH.D.,[‡] CHARITY G. MOORE, PH.D., M.S.P.H.,[‡] M. PAIGE POWELL, PH.D.,[§] AND JANICE C. PROBST, PH.D.[‡]

Department of Health Sciences, College of Health Professions, Armstrong Atlantic State University, Savannah, Georgia

ABSTRACT. Objective: Rural residence was once perceived as protective regarding youthful alcohol use and its effects. Our study examined whether the relationship between alcohol use in youth and early adulthood and subsequent employment outcomes differed for rural and urban youth. **Method:** Data from a 20-year panel survey, the National Longitudinal Survey of Youth 1979, were used to address the association between alcohol use between the ages of 17 and 26 and employment outcomes during adulthood. Early drinking experiences and misuse symptoms were used as drinking behavior measures. Rural was defined as living outside any Metropolitan Statistical Area. Employment outcomes were defined using employment status and employment quality. Analyses were weighted to reflect the stratified sample design ($N =$

8,399). **Results:** Drinking behaviors did not differ by residence. In bivariate analysis, alcohol use measures during youth were consistently associated with working more than 40 hours per week and earning irregular compensation. For three of seven employment quality measures examined, interactions between residence and alcohol use were observed in multivariable analysis. Rural youth were more likely to suffer adverse employment consequences. **Conclusions:** Rural residence does not appear to provide protection from the effects of drinking during youth on adulthood employment and was associated with adverse outcomes. Further research is needed to ascertain whether such differences stem from different availability of services or other characteristics of the rural environment. (*J. Stud. Alcohol Drugs* 69: 266-274, 2008)

ALCOHOL CONSUMPTION HAS BECOME common among American youth. In 2003, 27.8% of high school students reported having tried alcohol before the age of 13 (Grunbaum et al., 2004). In 2005, 74.3% of students in the 9th through 12th grades reported having ever consumed alcohol, and 43.4% reported having a drink within the last 30 days (Eaton et al., 2006). As adolescents age, the rate of alcohol use rises dramatically. Sobecck et al. (2000) found that 29% of sixth graders had tried alcohol at the beginning of the year; by the end of the year, that percentage had increased to 44%. The National Household Survey on Drug Abuse found that the proportion of students who reported drinking in the last month jumped from 3% at age 12 to 56% by age 20 (Substance Abuse and Mental Health Services Administration, 2001).

Episodic heavy drinking, defined as having five or more drinks on one occasion, is a common form of alcohol misuse among youth (Dennis, 2002). In 2005, 25.5% of high school students had engaged in episodic heavy drinking during the previous 30 days, with prevalence rates increas-

ing between the 9th through 12th grade (19.0% vs 32.8%; Eaton et al., 2006).

Early drinking and adult employment

Early onset of alcohol consumption is troubling because of its association with future alcohol misuse, education, and employability. Those who start drinking before age 15 are four times more likely to develop alcohol dependence later in life (Grant and Dawson, 1997), and those who report intoxication before the age of 19 are also more likely to participate in risky behaviors, such as driving while under the influence (Hingson et al., 2003).

Concurrent alcohol use has been studied more frequently than the lagged effects of youthful use. An estimated 8% of the U.S. workforce consumes alcohol either immediately before or during the workday (Frone, 2006). Alcohol misuse among workers can lead to as much as a 12% loss of productivity and a reduction in fringe benefits (Kenkel and Wang, 1998).

Received: November 14, 2007. Revision: November 19, 2007.

*The research reported in this article was supported in part by grant 6 U I C R H 00045-03 with the Federal Office of Rural Health Policy, Health Resources and Services Administration, U.S. Department of Health and Human Services.

[§]Correspondence may be sent to Janice C. Probst at the South Carolina Rural Health Research Center, Arnold School of Public Health, University of South Carolina, 220 Stoneridge Drive, Suite 204, Columbia, SC 29210 or via email at: jprobst@gwm.sc.edu. Jong-Yi Wang is with the Department of

Health Services Administration, China Medical University, Taichung, Taiwan. Kevin J. Bennett is with the Department of Family and Preventive Medicine, University of South Carolina School of Medicine, Columbia, SC. Charity G. Moore was with the Department of Medicine, Division of General Medicine and Epidemiology, University of North Carolina at Chapel Hill, Chapel Hill, NC. She is now with the Center for Research on Health Care Data Center, University of Pittsburgh, Pittsburgh, PA. M. Paige Powell with the University of Alabama at Birmingham and the Deep South Center on Effectiveness, Birmingham Veterans Administration Medical Center, Birmingham, AL.

Concurrent alcohol use has been linked to poorer employment outcomes, as indicated by a higher probability of unemployment (Mullahy and Sindelar, 1996), or blue-collar employment and employment in situations with fewer fringe benefits (Kenkel and Wang, 1998). However, other researchers have suggested that employment effects stem from underlying characteristics of the individual leading to alcohol use, rather than constituting a clear effect of alcohol behaviors (Feng et al., 2001). A recent longitudinal analysis focused on the links between employment in 1987-1988 and drinking behaviors in 1991-1992 but did not explore the reverse (Rodriguez and Chandra, 2006).

The effects of alcohol use on personal income are unclear. Several researchers have shown a negative association between alcohol consumption and personal income (Mullahy and Sindelar, 1993; Harwood et al., 1998), although others have found a positive relationship between drinking and income (Berger and Leigh, 1988; Cook, 1991; Gill and Michaels, 1992). A possible explanation of these contradictory findings is a nonlinear relationship, where wages increase with moderate alcohol consumption but decrease with heavy drinking (French and Zarkin, 1995; Mullahy and Sindelar, 1992). At least one study, however, explored this inverse U-shaped relationship but did not find the expected decrease in wages among heavy drinkers (Zarkin et al., 1998).

Early alcohol use may also affect employment indirectly through educational attainment. Mullahy and Sindelar (1989) found a link between alcoholism before the age of 18 and lower educational attainment. Heavy drinkers ages 12-17 were twice as likely to report poor schoolwork and four to six times more likely to have cut class or skipped school (Greenblatt, 2000). Also, high school students who misuse alcohol have been shown to be less likely to graduate from high school (Yamada et al., 1996) or obtain a 4-year college degree (Cook and Moore, 1993). College students who drink reported subsequent academic problems, such as missed class time, poor exam results, and lower grades (Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism, 2002).

Alcohol and rural residence

In the past, it was believed that rural areas, because of their strong social connections, had lower rates of alcohol and substance misuse. Recent studies, however, suggest that the rural-urban gap has closed (William, 2001). In 2000, rural youth ages 12-17 years old had higher rates of past-month alcohol use as well as higher rates of heavy use than did urban youth. Rural residents live markedly farther from facilities treating alcohol dependence or abuse than do urban residents (Substance Abuse and Mental Health Services Administration, 2002), and rural persons entering inpatient alcohol or drug treatment programs are more likely

to be referred by the criminal justice system and less likely to be referred by an outpatient provider than are urban residents (Substance Abuse and Mental Health Services Administration, 2005). Thus, rural youth may have a lower chance of positive intervention, with related higher risk for effects of alcohol on adulthood employment.

Research questions

The purpose of the present study is to explore the relationships among rural residence during youth, early alcohol use behaviors, and adult employment outcomes. Below are the specific research questions posed by this study:

1. Are rural youth at higher risk of engaging in early drinking behaviors than urban youth?
2. Do rural and urban youth have the same employment outcomes in adulthood?
3. Are early drinking behaviors associated with negative employment outcomes in adulthood?
4. Is the association between early drinking behaviors and adulthood employment outcomes different between rural and urban residents?

Method

Population

This study used data from the National Longitudinal Survey of Youth-1979 (NLSY79; Center for Human Resource Research, 2001). The NLSY79 is a longitudinal panel study of a nationally representative sample of persons who were between the ages of 14 and 22 when recruited in 1979. The NLSY79 followed this cohort annually until 1994 and bi-annually thereafter; the panel is still ongoing. The data from the NLSY79 cohort include detailed information on a number of topics, including alcohol consumption and employment. The present research uses data from 8,399 respondents still participating in the study in 1998.

Independent variables

Drinking behaviors were measured using information from 1979-1984 survey administrations, a period when respondents were considered youth or young adults. Three measures of potentially harmful alcohol use were used: early onset drinking (two or more drinks before the age of 18), episodic heavy drinking (having six or more drinks on one occasion anytime during 1982-1984), and agreement that the respondent's work/school was negatively affected by drinking (any answer in 1982, 1983, or 1984 stating that drinking had interfered with school/work or with a job).

We also used the presence of potential misuse or dependency symptoms in 1984 as measures of problematic alcohol use behavior. Conflict behavior was defined by a report

of any of the following while drinking: (1) felt aggressive/cross, (2) got into a heated argument, or (3) got into a fight. Alcohol-related loss of control was defined by a positive response to any of the following: (1) afraid might become alcoholic, (2) difficult to stop until completely intoxicated, (3) often take a drink first thing in the morning, (4) hands shake in the morning, (5) gotten high or tight when drinking by yourself, (6) kept on drinking after you promised yourself not to, (7) cannot remember activity while drunk, or (8) tried to cut down or quit drinking but failed.

Rural was defined as living in a county that was not part of a Metropolitan Statistical Area. Rural residence was measured at two points in time. As an independent variable throughout the study, rural is based on where the individual lived at the beginning of the survey, in 1979. As a control variable for economic outcomes, rural uses the respondent's county of residence in 1998.

Dependent variables

Employment quality measures in 1998 were applied to all persons in the workforce, regardless of employment status. Employment quality measures for those in the labor force were the following: (1) employed versus unemployed; (2) household income greater than 125% of poverty level versus lower; (3) full time (40 hours per week) versus part time; (4) regular versus temporary job; (5) receiving irregular pay, defined as overtime pay, tips, or commissions versus salary; (6) receiving health insurance versus not; and (7) having two or more jobs versus not. For the purposes of this study, a respondent was classified as unemployed only if they were active participants in the labor force.

Other variables

Multiple factors beyond alcohol use during youth can affect adult employment. Demographic characteristics of the individual held constant in multivariate analysis include race/ethnicity (white, black, and Hispanic only; other races were poorly represented in the data set), gender, and age in 1979. The physician/population ratio in the respondent's county of residence in 1979 was used as a proxy for the general availability of health services, including alcohol prevention and treatment services. Education was based on final education as reported in 1998 and was dichotomized into 12 or fewer years of education versus more. High school education is generally equal to completing 12 years of school, although this variable does not specifically measure high school graduation. Marital status in 1998 (married/not) was also included. Characteristics of the respondent's county of residence in 1998 were held constant, because they could influence the number and type of jobs available. County characteristics in 1998 included rural (vs urban), percentage of families in poverty, percentage of residents

with a college degree or more, percentage of residents who were nonwhite, unemployment rate, and percentage of the workforce in manufacturing.

Analysis

Only respondents to the 1998 NLSY79 were included in the bivariate and multivariable analyses ($N = 8,399$). All analyses were done in SAS (SAS Institute Inc., Cary, NC)-callable SUDAAN (RTI International, 2006), using the 1998 sampling weights to reflect the complex design of the survey. Chi-square and logistic regression were used to predict employment status in 1998. We tested interactions between residence and youth drinking behaviors to ascertain if the association between youth drinking behaviors and employment outcomes differed based on rural versus urban residence during youth. These tests were conducted with all of the personal and county level characteristics listed in the preceding section held constant, to allow accurate assessment of the effects of residence during youth. Odds ratios (ORs) and 98% confidence intervals (CIs) were presented for levels of the independent variables stratified by residence if the interaction term was found to be significant at $\alpha = .05$.

We set our $\alpha = .05$ for each of the set of independent and dependent variable measures. To reduce the potential for a Type I error when a number of comparisons were made within a group of related variable measures, we decreased α based on the number of measures. For example, when comparing employment outcomes among persons with early versus later onset of drinking, we lowered our Type I error rate to .007 (.05/7) based on the number of outcome measures being compared simultaneously.

Results

Baseline: Sample, youth drinking, and employment

Characteristics of NLSY79 respondents. In 1979, 21.0% of participants lived in rural areas (Table 1). There were no significant differences in age, gender, or poverty status based on residence during youth. However, rural respondents were more likely to be nonblack/non-Hispanic than urban respondents (85.5% vs 77.3%, 2 df, $p = .0004$; Table 1). Most respondents were still living in an environment similar to that of their youth. Among rural youth in 1979, 70.4% lived in rural counties in 1998; among urban youth in 1979, 80.8% lived in urban counties in 1998 (Table 1).

Drinking behaviors in youth

Almost half of all respondents (47.6%) indicated drinking before the age of 18 and just above half (55.3%) indicated episodic heavy drinking. Only 9.7% of respondents

TABLE 1. Characteristics of NLSY79 respondents in 1998, by residence during youth in 1979

Variable	Rural residence in 1979		Urban residence in 1979		<i>p</i>
	Unwt'd <i>n</i>	Wt'd %	Unwt'd <i>n</i>	Wt'd %	
Total	1,546	21.0	6,678	79.0	—
Age in 1998, mean	36.7	—	36.7	—	.2035
Gender					
Male	1,176	51.6	2,747	49.5	.1734
Female	1,220	48.4	3,041	50.5	
Race/ethnicity					
Hispanic	305	3.6	1,281	7.6	.0526
Black	692	10.9	1,775	15.1	
Nonblack, non-Hispanic	1,399	85.5	2,732	77.3	
Poverty status, 1979					
Not in poverty	1,598	82.4	4,155	85.4	.1367
In poverty	645	17.6	1,297	14.6	
Poverty status, 1998					
Not in poverty	1,148	92.0	4,821	91.5	.8814
In poverty	137	8.0	611	8.5	
Marital status in 1998					
Never married	442	13.8	1,309	17.9	.0123
Married	1,421	65.6	3,132	61.3	
Other	533	20.6	1,347	20.8	
Years of schooling completed in 1998					
>12 years	974	44.9	2,634	48.7	.0965
≤12 years	1,422	55.1	3,154	51.3	
Residence in 1998					
Rural	1,106	70.4	1,257	19.2	<.0001
Urban	406	29.6	5,258	80.8	

Notes: ***Bold/italics*** indicates statistical significance. NLSY79 = National Longitudinal Survey of Youth-1979; unwt'd = unweighted; wt'd = weighted.

indicated that drinking during youth affected their school or work performance at that time. None of these behaviors differed significantly between rural and urban residents (Table 2).

Almost one fifth (19.7%) of all respondents indicated at least one alcohol-related conflict behavior, and almost one fourth of all respondents (23.5%) indicated at least one

symptom of loss of control. These proportions were the same regardless of rural or urban residence (Table 2).

Adulthood employment characteristics

Within this cohort, rural residents were more likely than urban residents to report participation in the workforce (e.g.,

TABLE 2. Drinking behaviors of youths and young adults, 1982-1984, by residence in 1979*

Drinking behaviors	All %	Rural residence in 1979		Urban residence in 1979		<i>p</i>
		%	SE	%	SE	
First drink before 18 years of age	47.6	46.5	2.1	48.0	0.9	.5158
Episodic heavy drinking	55.3	53.2	2.8	55.9	1.2	.3526
Work/school impacted	9.7	10.6	1.1	9.3	0.5	.2658
Dependency: Conflict behaviors*	19.7	19.7	1.7	19.7	0.8	.9965
Cross while drinking	19.3	20.3*	1.3	19.1	0.8	.4026
Heated argument while drinking	17.6	20.6*	1.4	16.9	0.7	.0190
Fought while drinking	8.4	10.5	1.3	7.9	0.5	.0588
Dependency: Loss of control*	23.5	22.8	1.6	23.8	0.7	.5768
Tried to quit but failed	6.6	8.1	1.1	6.2	0.5	.1009
Afraid might be alcoholic	5.7	6.5	1.0	5.5	0.5	.3306
Difficult to stop until drunk	5.3	7.5	1.0	4.8	0.4	.0125
Loss of memory while drinking	16.5	20.0	1.6	15.6	0.7	.0109
Drink first thing in the morning	2.1	2.7	0.6	1.9	0.2	.2582
Hand shakes morning after drinking	4.4	4.1	0.7	4.4	0.4	.6160
Get high while alone	9.7	10.7	1.4	9.5	0.6	.3944
Kept drinking after promises to stop	8.5	10.4	1.3	8.0	0.5	.0989

Notes: Numbers are calculated using 1998 sampling weights. Analysis is limited to individuals who provided employment data in 1998. *Conflict behaviors, $\alpha = .05/3 = .0167$; loss of control, $\alpha = .05/8 = .00625$.

TABLE 3. Employment characteristics, 1998, by residence in youth/young adulthood, 1979

Employment outcome measures, 1998*	All %	Rural residence in 1979		Urban residence in 1979		<i>p</i>
		%	SE	%	SE	
Participating in workforce	86.0	88.5	0.9	85.3	0.6	.0061
Employed (those in workforce)	96.4	97.0	0.5	96.3	0.3	.2739
Income under 125% of poverty	23.3	26.6	1.4	22.4	1.0	.0099
Working \geq 40 hours per week	67.8	72.0	1.6	66.6	0.8	.0048
Permanent employment	92.3	93.5	0.8	91.9	0.4	.0767
Irregular compensation	27.9	30.7	1.4	27.0	0.8	.0254
\geq 2 jobs at once	24.8	26.1	1.4	23.8	0.7	.1376
Receiving health insurance	79.5	77.0	1.3	80.2	0.7	.0244

Notes: ***Bold/italics*** indicates statistical significance. Numbers are calculated using 1998 sampling weights.
* $\alpha = .05/8$, or .00625.

employed, unemployed, or active armed services; 88.5% vs 85.3%, 1 df, $p = .0061$). Of those in the workforce, 96.4% reported being employed, with no significant differences by residence.

One of these six employment quality measures (EQM) differed by residence (Table 3). Specifically, rural residents were more likely to work 40 hours or more per week (72.0% vs 66.6%, 1 df, $p = .0048$) than urban residents.

Drinking behaviors during youth and adult employment outcomes

Respondents who started drinking before the age of 18 (early onset) were just as likely to be employed at follow-up as respondents who started drinking at age 18 or later (Table 4). However, early-onset drinkers were more likely than later-onset drinkers to work 40 hours or more per week (70.9% vs 65.9%, 1 df, $p = .0003$) and receive irregular pay (30.7% vs 25.9%, 1 df, $p = .0001$). The other four measures of employment quality showed no differences across early-onset and later-onset drinkers.

Respondents who reported episodic heavy drinking in their youth were just as likely as those without this behavior to be employed as adults (96.4% vs 96.6%, 1 df, $p = .6096$) but more likely to work 40 or more hours per week (72.9% vs 62.6%, 1 df, $p < .0001$). Respondents reporting episodic heavy drinking during youth were less likely than those without this behavior to report incomes lower than 125% of the poverty level (21.1% vs 25.4%, $p = .0002$) but were more likely to report irregular compensation (30.9% vs 24.8%, 1 df, $p < .0001$). Early heavy drinking did not appear to affect job permanence, concurrent employment, or health benefits (Table 4).

There were no significant differences in employment status or any employment quality measure between youth who reported that their work or school performance was adversely affected by drinking and youth who did not report such impact. Although denial of adverse effects is a common feature of alcohol addiction, strong associations between dependency symptoms and work performance during

youth suggest that there was little reporting bias in the original survey, or at least a consistent bias. Specifically, respondents with conflict behavior symptoms and loss of control symptoms were more likely to report that their youth work performance was affected by drinking. In detail, 15.9% of respondents with conflict behavior symptoms reported their work performance affected by drinking versus 3.4% among those without such symptoms (1 df, $p < .0001$), and 16.5% of respondents with loss of control had their work performance affected versus 2.6% of those without loss of control (1 df, $p < .0001$; all data from 1984; not in tables).

Respondents with conflict behavior symptoms in youth were more likely than those without such symptoms to work 40 or more hours per week (72.3% vs 67.1, 1 df, $p = .0028$) and earn irregular compensation (32.4% vs 26.9%, 1 df, $p = .0017$). Conflict behavior symptoms were not associated with employment status, income level, job permanence, concurrent employment, or health benefits (Table 4).

Respondents reporting loss of control symptoms during young adulthood were more likely than those without such symptoms to work 40 or more hours per week (74.2% vs 66.2%, 1 df, $p < .0001$) and to earn irregular compensation (32.6% vs 26.5%, 1 df, $p = .0009$) in 1998.

Adjusted effects of rural residence during youth on employment outcomes

Logistic regression analyses were used to test if differences were present in the associations between adult employment outcomes and drinking behavior for rural versus urban youth. An interaction term crossing residence during youth with each of the five drinking behaviors listed in Table 4 was used to test for residence differences. In each case, urban respondents who did not report the behavior served as the reference group. All employment quality measures were tested, using each of the five behaviors. Regression analyses controlled for characteristics of the individual, in addition to residence during youth, which might affect employment outcomes, including race/ethnicity, gender, age

TABLE 4. Drinking behaviors during youth, 1982-1984 and adult employment outcomes, among persons in the workforce, 1998

Employment outcomes	Proportion reporting each employment outcome by drinking behavior during youth		
	Early onset	Late onset	<i>p</i>
Employed	96.3	96.7	.3772
With income <125% of poverty	23.3	22.9	.6969
Working ≥40 hours per week	70.9	65.9	.0003
Permanent employment	91.4	92.6	.1551
Irregular compensation	30.7	25.9	.0001
≥2 jobs at once	25.0	23.7	.2339
Receiving health benefits	78.7	80.4	.1617
	Episodic heavy drinking	No episodic heavy drinking	<i>p</i>
Employed	96.4	96.6	.6096
With income <125% of poverty	21.1	25.4	.0002
Working ≥40 hours per week	72.9	62.6	<.0001
Permanent employment	91.8	92.3	.5802
Irregular compensation	30.9	24.8	<.0001
≥2 jobs at once	24.3	24.4	.9430
Receiving health benefits	79.7	79.5	.8792
	Work impacted	Work not impacted	<i>p</i>
Employed	97.1	96.4	.3053
With income <125% of poverty	21.5	23.2	.3755
Working ≥40 hours per week	70.6	68.0	.1849
Permanent employment	92.8	92.0	.5014
Irregular compensation	30.0	28.0	.3681
≥2 jobs at once	23.8	24.6	.3319
Receiving health benefits	77.2	79.8	.2281
	Conflict behavior	No conflict behavior	<i>p</i>
Employed	96.0	96.5	.4618
With income <125% of poverty	23.7	23.1	.7007
Working ≥40 hours per week	72.3	67.1	.0028
Permanent employment	90.6	92.5	.0607
Irregular compensation	32.4	26.9	.0017
≥2 jobs at once	23.8	24.6	.6099
Receiving health benefits	77.6	79.9	.1405
	Loss of control	No loss of control	<i>p</i>
Employed	95.7	96.7	.1171
With income <125% of poverty	24.2	22.8	.2836
Working ≥40 hours per week	74.2	66.2	<.0001
Permanent employment	91.5	92.3	.3760
Irregular compensation	32.6	26.5	.0009
≥2 jobs at once	24.8	24.4	.7724
Receiving health benefits	76.6	80.4	.0097

Notes: $\alpha = (.05/7)$ or $p = .0071$. **Bold/italics** = significant at $p < .0071$.

in 1979, marital status in 1998, years of school in 1998, and ecological characteristics, including current residence, as noted in the Method section. Because these were multiple comparisons, the significance level was set for = .0071 for the individual ORs. Of the seven employment quality outcomes tested, rural versus urban residence interacted with drinking behaviors during youth for only three: employment status, irregular compensation (overtime, commissions

and tips), and health benefits. Only these significant results are shown (Table 5).

Two alcohol variables interacted significantly with residence during youth when modeling whether persons in the workforce would report current employment in 1998 (Table 5). With present personal and ecological characteristics held equal, rural residents who did not report work impacts of drinking during youth were more likely than similar urban persons to be employed in 1998 (OR = 4.59; 98% CI: 1.81-11.66). Urban youth who exhibited loss of control while drinking were less likely than urban youth without this symptom to be employed in 1998 (OR = 0.50; 98% CI: 0.30-0.85); however, rural respondents did not differ from urban respondents regarding 1998 employment regardless of loss of control status.

Three alcohol variables interacted significantly with residence during youth when with regard to irregular compensation in 1998, with each indicating rural disadvantage. Rural youth who reported episodic heavy drinking were more likely than urban youth who did not report this behavior to have irregular compensation in 1998 (OR = 1.44; 98% CI: 1.07-1.95), although urban youth with this behavior did not differ from their urban peers. Similarly, rural youth who reported conflict behavior associated with drinking were more likely to report irregular compensation than urban youth without this behavior (OR = 2.15; 98% CI: 1.43-3.23), although no differences were present for urban youth. Finally, rural residents who exhibited loss of control were more likely to report irregular compensation than urban residents without loss of control (OR = 1.88; 98% CI: 1.17-3.01), although others did not differ from the referent group (Table 5).

One final interaction of symptoms with residence was found. Rural youth with loss of control symptoms were less likely to receive health benefits than urban youth without this symptom (OR = 0.54; 98% CI: 0.33-0.91), although urban youth with loss of control did not differ from their urban peers.

Discussion

Rural youth and drinking behaviors

Rural youth surveyed in 1979-1984 were just as likely as their urban counterparts to report drinking, engage in episodic heavy drinking, and report conflict behaviors or loss of control as a result of drinking. These results are consistent with earlier research that suggests rural youth are just as likely as urban youth to engage in early drinking behaviors.

Among the NLSY79 cohort, respondents who lived in rural and urban areas in 1989 were equally likely to report being employed in 1998, but rural respondents were more likely to report participation in the workforce. Participation

TABLE 5. Effects of rural residence and alcohol behaviors during youth on adult employment outcomes.^a Only measures with statistically significant residence/behavior interactions are shown.

Employment quality measure	Predictors	OR	Lower 98% CI	Upper 98% CI	<i>p</i>
Employed	Rural × Work Impacted	1.57	0.33	7.42	.4997
	Rural × Not Impacted	4.59	1.81	11.66	.0002
	Urban × Work Impacted	0.79	0.35	1.82	.5152
	Rural × Loss of Control	5.18	0.78	34.57	.0435
	Rural × No Loss of Control	1.77	0.69	4.58	.1598
	Urban × Loss of Control	0.50	0.30	0.85	.0024
Earning irregular compensation	Rural × Episodic Heavy Drinking	1.44	1.07	1.95	.0049
	Rural × No Episodic Heavy Drinking	1.32	0.93	1.86	.0666
	Urban × Episodic Heavy Drinking	1.24	1.00	1.55	.0189
	Rural × Conflict Behavior	2.15	1.43	3.23	<.0001
	Rural × No Conflict Behavior	1.18	0.84	1.66	.2507
	Urban × Conflict Behavior	1.09	0.84	1.41	.4543
	Rural × Loss of Control	1.88	1.17	3.01	.0021
	Rural × No Loss of Control	1.22	0.86	1.73	.1831
	Urban × Loss of Control	1.13	0.89	1.44	.2359
With health benefits	Rural × Loss of Control	0.54	0.33	0.91	.0059
	Rural × No Loss of Control	1.09	0.74	1.62	.6074
	Urban × Loss of Control	0.80	0.62	1.03	.0398

Notes: **Bold/italics** indicates statistical significance. Numbers are calculated using 1998 sampling weights. $\alpha = (.05/7)$ or $p = .0071$. OR = odds ratio; CI = confidence intervals. ^aAll analyses controlled for race/ethnicity, gender, age in 1979, marital status in 1998, years of school completed in 1998, physician rate per 100,000 persons in 1979, and the following county characteristics measured in 1998: percentage of families in poverty, percentage of persons with college degree or more, percentage minority, unemployment rate, and percentage of workforce in manufacturing.

in the workforce reflects actively engaging in or seeking employment. Nonparticipation may be voluntary (e.g., homemakers) or involuntary (disabled) and is difficult to interpret. For the purposes of this study, participation level was not used as an employment outcome but as a means for better defining unemployment as a true measure of those actively seeking employment. Among the actively employed, rural respondents reported a lower overall quality of employment than urban respondents. Specifically, rural respondents were more likely to work more than 40 hours per week.

Early drinking and employment outcomes

This study first tested for associations between early drinking behaviors and adult employment outcomes. Four drinking behaviors—early onset of drinking, episodic heavy drinking, conflict behaviors, and loss of control—were each positively associated with working more hours per week and earning irregular compensation. Reported effects of alcohol consumption on work or school performance during youth were not related to adulthood employment outcomes. Although difficult to interpret, it appears that early drinking behavior does not affect whether an individual remains in the workforce but is associated with somewhat lower employment quality.

A key purpose of the study was to examine whether the effects of youth drinking differed based on where the individual lived at that time. The effects of residence and early

drinking behaviors on employment outcomes were tested using multivariable analysis that controlled for several individual and county level characteristics, including current residence. Specifically, tests were run to determine if there were statistically significant interactions between residence and behavior during youth.

Although few effects were found, a pattern of rural disadvantage does appear to be present. First, rural youth who reported that drinking affected their work or school performance were markedly more likely than similar urban youth to be in the workforce, and youth who did have this problem did not differ from the baseline. Finding that the advantage conveyed by the absence of problematic drinking was markedly greater for rural youth, suggests that the converse may also be true: the adverse effects of alcohol might be greater for rural youth. This notion is supported by the results regarding irregular compensation, which found that rural residents who reported alcohol behavior or symptoms were more likely than urban referent groups to earn irregular compensation, yet urban individuals with these problems were not more likely to report this adverse employment outcome. This finding held across three problematic behaviors: episodic heavy drinking, conflict behavior, and loss of control. Similarly, rural residents who reported alcohol related loss of control were markedly less likely to have health insurance than urban residents without this problem, although urban youth with loss of control did not differ significantly from other urban youth. These results suggest

that early drinking behavior is more likely to compromise future employment quality for rural youth than for urban youth. Further research is needed to understand the mechanisms underlying these differences, which may stem from a lack of treatment options in rural areas.

For many potential aspects of youth drinking, however, the relationships between residence, drinking behaviors, and employment quality display no fixed pattern. These findings suggest that residence does not consistently affect the relationship between early drinking behaviors and the quality of employment in adulthood.

Limitations

This study was descriptive in nature and based on secondary analysis of an existing data set, leading to multiple limitations. First, the measures used to assess alcohol use reflect practices in the late 1970's, when the study was designed. More sensitive and specific measures of alcohol use and effects might be used in a present-day study. Second, the NLSY79 population was intended to constitute a nationally representative sample of white, black, and Hispanic youth in 1979, limiting generalizability. Asian and American Indian/Native American youth were not included in the original population, and thus study findings may not apply to these groups. Further, rapid immigration over the past 20 years may have changed the composition of the Hispanic population in the United States, further reducing generalizability. In addition, the analysis used 1998 sampling weights, which account for attrition when projecting back to the national populations of the three racial/ethnic groups studied, but these weights may not yield valid estimates if attrition was nonrandom. Next, the current study used a broad definition of rural, as county of residence within or not within a metropolitan statistical area, which does not distinguish smaller towns from midsize cities. Finally, although this study used data from two points in time, it is still impossible to determine a causal effect from this analysis.

Further limitations to the present research arise from factors beyond the scope of the analysis, which could have contributed to drinking behaviors, employment status or the relationships among these factors. These include the drinking age in a state at the time drinking behavior was reported (some states at that time had 18 years of age as the drinking age), whether a person lived in a "dry" county (very common in the Southeast), actual availability of alcohol or drug treatment services in either schools or community, what a person's educational aspirations were, the opportunities for jobs that did not require college education or a high school diploma, family and friend influences (negative or positive peer pressure), and many more. Future multivariable analysis must include a system or variables to control for many of these factors.

Conclusions

Further analysis is needed to verify and extend the link between early alcohol behaviors and quality of employment among rural residents. The present study, holding multiple demographic factors constant, found that where an individual lived when young influenced the effects of such behaviors on an important element of adult well-being: quality of employment. However, the analysis is preliminary and needs to be expanded by future research. These expanded analyses could take into consideration the actual availability of potential treatment services are needed, to ascertain whether rural/urban differences stem directly from differences in service availability, or result from other aspects of the rural environment. Additional factors, such as educational opportunities, employment opportunities, and economic infrastructure, may be important. Finally, it is important to ascertain whether the rural/urban disparities documented by the present research, which pertain to behaviors that occurred more than 20 years ago, would have similar effects in the current treatment and intervention environment.

References

- BERGER, M.C. AND LEIGH, J.P. The effect of alcohol use on wages. *Appl. Econ.* **20**: 1343-1351, 1988.
- CENTER FOR HUMAN RESOURCE RESEARCH. NLSY79 User's Guide: A Guide to the 1979-2000 National Longitudinal Survey of Youth Data. Columbus, Ohio: Ohio State University, 2001.
- COOK, P.J. The social costs of drinking. In: ASSLAND, O.G. (Ed.) *Expert Meeting on Negative Social Consequences of Alcohol Use*, Oslo, Norway, August 27-31, 1990, Oslo, Norway: Norwegian Ministry of Health and Social Affairs, 1991, pp. 49-94.
- COOK, P.J. AND MOORE, M.J. Drinking and schooling. *J. Hlth Econ.* **12**: 411-429, 1993.
- DENNIS, M.L. Treatment Research on Adolescent Drug and Alcohol Abuse: Despite Progress, Many Challenges Remain. Connection, May 2002, pp. 1-2, 7, Washington, DC: AcademyHealth, 2002.
- EATON, D.K., KANN, L., KINCHEN, S., ROSS, J., HAWKINS, J., HARRIS, W.A., LOWRY, R., McMANUS, T., CHEN, D., SHANKLIN, S., LIM, C., GRUNBAUM, J.A., AND WECHSLER, H. Youth Risk Behavior Surveillance—United States, 2005. *MMWR* **55** (SS05): 1-108, 2006.
- FENG, W., ZHOU, W., BUTLER, J.S., BOOTH, B.M., AND FRENCH, M.T. The impact of problem drinking on employment. *Hlth Econ.* **10**: 509-521, 2001.
- FRENCH, M.T. AND ZARKIN, G.A. Is moderate alcohol use related to wages? Evidence from four worksites. *J. Hlth Econ.* **14**: 319-344, 1995.
- FRONE, M.R. Prevalence and distribution of alcohol use and impairment in the workplace: A U.S. national survey. *J. Stud. Alcohol* **67**: 147-156, 2006.
- GILL, A.M. AND MICHAELS, R.J. Does drug use lower wages? *Ind. Labor Relat. Rev.* **45**: 419-434, 1992.
- GRANT, B.F. AND DAWSON, D.A. Age at onset of alcohol use and its association with DSM-IV alcohol abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *J. Subst. Abuse.* **9**: 103-110, 1997.
- GREENBLATT, J.C. Patterns of Alcohol Use Among Adolescents and Associations with Emotional and Behavioral Problems, Rockville, MD: Office of Applied Studies, Substance Abuse and Mental Health Services Administration, 2000.

- GRUNBAUM, J.A., KANN, L., KINCHEN, S., ROSS, J., HAWKINS, J., LOWRY, R., HARRIS, W.A., MCMANUS, T., CHIYEN, D., AND COLLINS, J. Youth Risk Behavior Surveillance—United States, 2003. *MMWR* **53** (SS02): 1-96, 2004.
- HARWOOD, H., FOUNTAIN, D., AND LIVERMORE, G. The Economic Costs of Alcohol and Drug Abuse in the United States-1992, NIH Publication No. 98-4327, Washington: Government Printing Office, 1998 (available at: www.nida.nih.gov/EconomicCosts/Index.html).
- HINGSON, R., HEEREN, T., ZAKOCS, R., WINTER, M., AND WECHSLER, H. Age of first intoxication, heavy drinking, driving after drinking and risk of unintentional injury among U.S. college students. *J. Stud. Alcohol* **64**: 23-31, 2003.
- KENKEL, D. AND WANG, P. Are Alcoholics in Bad Jobs? NBER Working Paper No. W6401, Cambridge, MA: National Bureau of Economic Research, 1998.
- MULLAHY, J. AND SINDELAR, J. Life cycle effects of alcoholism on education, earnings, and occupation. *Inquiry* **26**: 272-282, 1989.
- MULLAHY, J. AND SINDELAR, J. Effects of alcohol on labor market success: Income, earnings, labor supply, and occupation. *Alcohol Hlth Res. World* **16**: 134-139, 1992.
- MULLAHY, J. AND SINDELAR, J.L. Alcoholism, work, and income. *J. Labor Econ.* **11**: 494-520, 1993.
- MULLAHY, J. AND SINDELAR, J. Employment, unemployment, and problem drinking. *J. Hlth Econ.* **15**: 409-434, 1996.
- RODRIGUEZ, E. AND CHANDRA, P. Alcohol, employment status, and social benefits: One more piece of the puzzle. *Amer. J. Drug Alcohol Abuse* **32**: 237-259, 2006.
- RTI INTERNATIONAL. SUDAAN Release 9, Research Triangle Park, NC, Research Triangle Institute, 2006.
- SOBECK, J., ABBEY, A., AGIUS, E., CLINTON, M., AND HARRISON, K. Predicting early adolescent substance use: Do risk factors differ depending on age of onset? *J. Subst. Abuse* **11**: 89-102, 2000.
- SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION (Office of Applied Studies). Summary of Findings from the 2000 National Household Survey on Drug Abuse, DHHS Publication No. (SMA) 01-3549, Rockville, MD: Substance Abuse and Mental Health Services Administration, 2001.
- SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION (Office of Applied Studies). Distance to Substance Abuse Treatment Facilities among Those with Alcohol Dependence or Abuse. Drug and Alcohol Services Information System, The DASIS Report, August 23, 2002, Rockville, MD: Substance Abuse and Mental Health Services Administration, 2002.
- SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION (Office of Applied Studies). Treatment Admissions in Rural Areas: 2003. Drug and Alcohol Services Information System, The DASIS Report, September 30, 2005, Rockville, MD: Substance Abuse and Mental Health Services Administration, 2005.
- TASK FORCE OF THE NATIONAL ADVISORY COUNCIL ON ALCOHOL ABUSE AND ALCOHOLISM. A Call to Action: Changing the Culture of Drinking at U.S. Colleges, NIH Publication No.02-5010, National Institute on Alcohol Abuse and Alcoholism, Bethesda, MD, 2002.
- WILLIAM, L.S. City kids and country cousins: Rural and urban youths, deviance, and labor market ties. In: MICHAEL, R.T. (Ed.) *Social Awakening: Adolescent Behavior as Adulthood Approaches*, New York: Russell Sage Foundation, 2001, pp. 379-414.
- YAMADA, T., KENDIX, M., AND YAMADA, T. The impact of alcohol consumption and marijuana use on high school graduation. *Hlth Econ.* **5**: 77-92, 1996.
- ZARKIN, G.A., FRENCH, M.T., MROZ, T., AND BRAY, J.W. Alcohol use and wages: New results from the National Household Survey on Drug Abuse. *J. Hlth Econ.* **17**: 53-68, 1998.



COPYRIGHT INFORMATION

TITLE: Early Alcohol Use, Rural Residence, and Adult
Employment

SOURCE: J Stud Alcohol Drugs 69 no2 Mr 2008

The magazine publisher is the copyright holder of this article and it is reproduced with permission. Further reproduction of this article in violation of the copyright is prohibited.