Early Alcohol Use, Rural Residence, and Adulthood Employment

South Carolina Rural Health Research Center

At the Heart of Public Health Policy

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October 2005

Funding acknowledgement:

This report was prepared under Grant No. 6 U I C RH 00045-03 with the Federal Office of Rural Health Policy, Health Resources and Services Administration

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Executive Summary

Study Purpose

Early onset of alcohol consumption may increase the risk of physical disease and psychological disorders. The relationship between alcohol consumption during youth/early adulthood and subsequent employment is not fully known. With fewer opportunities for corrective intervention, the consequences of abusive drinking during youth or young adulthood may be greater for rural residents. The purpose of the present study was to determine whether alcohol use in youth and early adulthood was more likely to result in adverse employment outcomes among youth living in rural areas than urban youth. The study draws information regarding youth alcohol use patterns and adult employment from the National Longitudinal Survey of Youth – 1979, which has been following a panel of young persons recruited in 1979 for more than 20 years. Rural was defined as living outside any Metropolitan Statistical Area. In the analysis, residence was defined as the area where the person resided in 1982-1984, when the drinking behaviors occurred.

Key findings

Drinking behaviors in youth/early adulthood

- Drinking during youth and early adulthood was common in the early 1980's. Nearly half (47.6%) of respondents reported drinking before age 18, and 55.3% reported binge drinking.
- Generally speaking, drinking behaviors did not differ significantly between rural and urban residents. One in five respondents (19.7%) in 1984 reported alcohol dependency related aggression (DRA) symptoms, and 23.5% alcohol dependency related loss of control (DRLC) symptoms. One in ten respondents (9.7%) indicated that drinking affected their school or work performance.
- Rural youth surveyed in 1979-1983 were as likely as their urban counterparts to start drinking before the age of 18, binge drink before 18, and report that work or school was impacted by drinking. Rural youth were more likely to report 3 of 11 dependency-related symptoms: arguing heatedly while drinking, difficulty stopping drinking once begun, and loss of memory while drinking, but did not differ on other measures.

Employment outcomes

- In unadjusted analysis, respondents who lived in rural areas in 1982-1984 were as likely as those who lived in urban areas in youth to report being employed in 1998. Of those employed, respondents who lived in rural areas during youth reported lower overall quality of employment in 1998 than urban respondents. Specifically, rural respondents were more likely to earn less than 125% of the federal poverty level, work more hours per week, earn irregular compensation (contracts, tips, and commission), and not receive health benefits.
- Multivariable logistic regression compared employment outcomes in 1998 across four groups, defined based on drinking behavior in 1982-1984: rural early-onset drinkers, rural later-onset drinkers, urban early-onset drinkers, and urban later-onset drinkers. Characteristics of the individual and his or her community in 1998 were held constant in

this analysis. The relationships among residence, drinking behaviors, and employment quality showed no fixed pattern. For example, irregular compensation was associated with rural early-onset drinkers, rural residents with DRA or DRLC symptoms, and rural binge drinkers respectively; however, it was also associated with urban binge drinkers and rural youth whose drinking does *not* impact work or school. These findings suggest that residence does not affect the relationship between early drinking behaviors and the quality of employment in adulthood. Rural residence does not provide added risk or protection to the effects of drinking during youth on adulthood employment.

Recommendations

Urban and rural youth share pressures from multiple sources to engage in risky behaviors. Present findings, regarding behaviors from twenty years ago, parallel analysis of more recent data concerning teen exposure to violence and drug abuse, which was found to be as high or higher in rural areas when compared to urban and suburban settings (Mink, Moore, Johnson, Probst, 2005). Reducing youth drinking and thus its potential effects on long-term employment status requires multiple simultaneous approaches. Programs geared towards youth that address drinking or drug prevention, enforcement of appropriate behavior and, when necessary, recovery from alcohol or drug problems must be available to rural as well as urban youth.

- Prevention: Rural school systems should partner with health care providers, mental health service providers, and community based advocacy groups such as Mothers Against Drunk Driving to ensure that all rural schools have alcohol and drug prevention education programs in place.
- Intervention and Enforcement: Public safety officials in rural communities should pair with local healthcare institutions, mental and drug abuse service agencies, and community advocacy groups to implement linked educational and enforcement programs directed at youth.
- Treatment: Rural school districts should pair with state and local mental health and substance abuse service providers to ensure adequate referral and treatment for youth with suspected alcohol or drug problems. Creative options for overcoming cost and distance barriers, such as tele-therapy, should be explored.

Future Research

- The apparent tendency for rural youth to exhibit higher alcohol dependence symptoms needs to be explored more fully. Factors such as environment, availability of alcohol, activity and leisure activities, income, and social influences may all affect rural youth differently than urban youth, leading to a higher rate of alcohol dependence.
- Further analysis needs to be done on the link between early onset of drinking and quality of employment among rural residents. Other factors, such as educational opportunities, employment opportunities, and economic infrastructure need to be taken into account. Even though this analysis did not find a significant link between early onset of drinking and income, the stability of income may be important.

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Chapter 1: Introduction

Alcohol Use and Youth

Alcohol consumption has become common among American youth. In 2003, 44.9% of high school students reported having a drink within the last 30 days and 27.8% reported having tried alcohol before the age of 13 (National Center for Chronic Disease Prevention and Health Promotion, 2004). As adolescents age, the rate of alcohol use rises dramatically. 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). More than 16% of those between the ages of 12 and 17 reported alcohol use over the past 30 days, 33.0% in the past year, and 41.7% within their lifetime (Substance Abuse and Mental Health Services Administration, 2001).

The most common form of alcohol abuse among youth is binge drinking, which has been increasing (Dennis, 2002). Binge drinking is defined as having five or more drinks on one occasion within the past 30 days, while heavy drinking is defined as consuming five or more drinks on five or more occasions within the past 30 days (Substance Abuse and Mental Health Services Administration, 2001). Among those aged 17 years old who used alcohol in the past month, 50% were classified as either binge or heavy drinkers (Greenblatt, 2000).

More than 10% of those between the ages of 12 and 17 reported binge drinking within the past 30 days, while nearly 3% reported heavy drinking (Substance Abuse and Mental Health Services Administration, 2001). Between the ages of 18 and 25, these numbers increase dramatically, to 40% and 13% respectively. After the age of 25, alcohol consumption in general,

including binge and heavy drinking, declines steadily (Substance Abuse and Mental Health Services Administration, 2001).

Early Drinking and Health Effects

Early onset of alcohol consumption is troubling, due to its association to future alcohol abuse, education, and employability. Those who start drinking before age 15 are four times more likely to develop alcohol dependence (Grant & Dawson, 1997). Those who report getting drunk before the age of 19 are also more likely to become alcohol dependent in later life and to participate in risky behaviors, such as driving under the influence (Hingson, Heeren, Zakocs , Winter, & Wechsler, 2003).

Alcohol consumption, in moderation, may be related to a reduced risk for developing cardiovascular disease (Wilkins, 2002; Burger, Mensink, Bronstrup, Thierfelder, & Pietrzick, 2004; Hoffmeister, Schelp, Mensink, Dietz, & Bohning, 1999) and cancers (Hoffmeister et al., 1999; Webb, Purdie, Bain, & Green, 2004). These protective effects, however, are greatly reduced or even reversed once alcohol consumption becomes excessive. The physical impact of alcohol abuse includes problems with the gastrointestinal tract, the cardiovascular system, and the neurological system (both central and peripheral). Alcohol abusers are also more prone to strokes, seizures, gastric ulcers, esophageal cancers, cardiac arrhythmias, liver disease (particularly cirrhosis), and pancreatic disorders (WebMD, 2003).

Psychological problems are also common among alcohol abusers, although the sequence of which occurs first may not be clear. These problems may include depression, anxiety disorders, antisocial disorders, schizophrenia, bipolar disorder, and attention deficit disorder (WebMD, 2003). Alcohol abusers are also at risk for other negative outcomes, such as injuries, criminal behavior, and poor social relationships (Borges et al., 2004; Vinson et al., 1995; Syre,

Pesa, & Cockley, 1999). Alcohol abusers are more likely to be seriously injured in a motor vehicle crash, even if they are not the driver (Cunningham, Maio, Hill, & Zink, 2002; Waller, Hill, Maio, & Blow, 2003).

Early Drinking and Employment

The relationship between alcohol consumption during youth and employment is unclear. According to the Substance Abuse and Mental Health Services Administration, full-time employees drink more than either part-time employees or the unemployed (2001). Other studies, however, did not find a strong relationship between alcohol use and employment (Feng, Zhou, Butler, Booth, & French, 2001; Koch & Ribar, 2001). In 1995, the National Institute on Drug Abuse (NIDA) estimated the economic impact of alcohol abuse to be nearly $170 billion. This figure included lost wages and productivity, along with health and medical care expenditures, premature deaths, and crimes. Others have shown that alcohol abuse can lead to as much as a 12% loss of productivity and a reduction in fringe benefits (Kenekl & Wang, 1998).

The effects of alcohol use on personal income are also unclear. Several researchers have shown a negative association between alcohol consumption and personal income (National Institute on Drug Abuse, 1995; Mullay & Sindelar, 1993), while others have found a positive relationship between drinking and income (Berger & Leigh, 1988; Cook, 1991; Gill & Michaels, 1992). A possible explanation of these contradictory findings is a non-liner relationship, where wages increase with moderate alcohol consumption, but decrease with heavy drinking and abuse (French & Zarkin, 1995; Mullahy & 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 (Mullahy & Sindelar, 1989) found a link between alcoholism before the age of 18 and lowered educational attainment. Heavy and binge drinkers aged 12 to 17 were twice as likely to report poor school work and 4-6 times more likely to have cut class or skipped school (Greenblatt, 2000). Also, high school students who abuse alcohol have been shown to be less likely to graduate from high school (Yamada, Kendix, & Yamada, 1996) or obtain a four-year college degree (Cook & Moore, 1993). College students who drink were more likely to report subsequent academic problems, such as missed class time, poor exam results, and lower grades (National Institute on Alcohol Abuse and Alcoholism, 2002).

The complex nature of employment, earnings, and social context makes it difficult to identify the influential factors. It is hypothesized that those who abuse alcohol are less productive and less able to perform their job duties. These effects of alcohol on productivity can be both immediate and cumulative. Alcohol abuse could affect the short-term ability of employees to do their jobs due to a reduction in physical or mental ability, representing a more immediate decrease in productivity due to alcohol abuse. A cumulative decrease in productivity evolves over time, due to lower educational attainment, training, or social instability.

Alcohol and Rural Residence

In the past, it was believed that rural areas, due to their strong social connections, had lower utilization of alcohol and substance abuse. Recent studies, however, suggest that the rural-urban gap has closed (William, 2001). Rural/urban differences in alcohol use varied by age group in 2000. Rural youths 12 to 17 years old had higher rates of past month alcohol use as well as higher rates of heavy use than did urban youths. Yet among young adults age 18 to 25, urban residents had a higher rate of past month alcohol use. There were relatively few

differences in the rates of binge drinking for youths or young adults by rural/urban status (Substance Abuse and Mental Health Services Administration, 2001).

Purpose and Research Questions

The purpose of the present study was to explore the effects of drinking behaviors among rural youth on the quality of employment in later adulthood. Residence, for this study, is residence during youth (1979 – 1984). Persons living outside a metropolitan statistical area during youth/young adulthood were classified as rural residents. While many respondents moved to urban areas during adulthood, or lived in rural areas that were subsequently reclassified as urban, they remain, for our study, "rural youth."

Below are the specific research questions posed by this project:

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 among rural residents?

Chapter 2: Results

Baseline: Sample, Youth Drinking, and Employment

Characteristics of NLSY-79 Respondents

Study respondents were first surveyed in 1979, with periodic re-surveys through 1998. In 1979, the sample included 3,466 rural (29.1% weighted) and 7,953 urban (70.9% weighted) youths. By 1998, many participants had moved or been lost to followup: 1,546 rural (44.6%) and 6,678 urban (84.0%) participants responded to the 1998 survey. Demographic distributions remained similar across both survey periods. In 1979, there were no significant differences between rural and urban respondents in age, sex, or poverty status (Table 1). However, rural respondents were more likely to be non-black/non-Hispanic than urban respondents (85.7% vs. 77.4%, p=0.0418, Table 1).

Drinking Behaviors in Youth

Youth drinking behaviors were measured during the period from 1979-1984 using four variables: early onset drinking (before age 18), binge drinking, work/school impacted by drinking, and alcohol dependency. Almost half of all respondents (47.6%) indicated drinking before the age of 18 and just over half (55.3%) indicated binge drinking. Only 9.7% of respondents indicated that drinking during youth affected their school or work performance during youth. None of these behaviors differed significantly between rural and urban residents (Table 2).

Alcohol dependency was measured by two related indices: Aggression and Loss of Control. Indicators of aggression included being irritable while drinking, arguing heatedly while

This study used data from the National Longitudinal Survey of Youth 1979 (NLSY79). The 2000 Geocoded dataset was used in this analysis and contains data from 1979 to 2000. The NLSY79 interviewed a nationally representative sample of 12,686 people who were between the ages of 14 and 22 in 1979. This cohort was re-interviewed annually until 1994, and every other year through 2000. For more details on the NLSY, see the Appendix. Because a great number of alcohol/outcome comparisons are reported in this report, only those significant at $p < 0.02$ or lower are reported.

drinking, and fighting while drinking. Indicators of Loss of Control included trying to quit but having failed, fear of being an alcoholic, difficulty stopping drinking until drunk, loss of memory while drunk, drinking first thing in the morning, hands shaking the morning after drinking, drinking while alone, and continued drinking after making promises to stop.

Almost one-fifth (19.7%) of all respondents indicated at least one symptom of dependency related aggression (DRA), and almost one-fourth of all respondents (23.5%) indicated at least one symptom of dependency related loss of control (DRLC). These proportions were the same regardless of rural or urban residence (Table 2). Three individual symptoms, however, differed significantly by residence. Rural respondents were more likely to report arguing heatedly while drinking (20.6% vs. 16.9%; p=0.0190), difficulty stopping until drunk (7.5% vs. 4.8%; p=0.0125), and loss of memory while drinking (20.0% vs. 15.6%; p=0.0109). The remaining eight symptoms did not differ by residence (Table 2).

Adulthood Employment Characteristics

All adulthood employment characteristics were measured in 1998. Employment status was measured as both participating in the workforce and being actively employed. Within this cohort, respondents who lived in rural areas during youth/young adulthood were more likely than urban residents to report participation in the workforce (e.g. employed, unemployed, or active armed services; 88.5% vs. 85.3%, p=0.0061). Of those in the workforce, 96.4% reported being employed, with no significant differences by residence.

Employment quality was assessed for those respondents who reported being currently employed using six variables: household income, hours worked per week, job permanence, compensation stability, concurrent employment, and receiving health benefits. Four of these six employment quality measures (EQM) differed by residence (Table 3). Specifically, persons

residing in rural areas during youth were more likely to earn less than 125% of poverty (26.6% vs. 22.4, p=0.0099), work 40 hours or more per week (72.0% vs. 66.6%, p=0.0048) than urban residents. These results suggest that individuals growing up in rural areas are just as likely to be employed as urban residents, but have a lower quality of employment. The following sections explore the relationships between drinking behaviors during youth, employment quality in adulthood, and residence.

Youth Drinking Behaviors, Residence, and Employment Outcomes

Early-Onset Drinking and Adult Employment

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 after age 18 (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%; p=0.0003) and receive irregular pay (30.7% vs. 25.9%; p=0.0001). Other measures of employment quality showed no differences across early-onset and later-onset drinkers, including income, job permanence, concurrent employment, and health benefits (Table 4). These results suggest that early onset drinking may not impair overall employability but may decrease the quality of employment. Among early onset drinkers, rural respondents showed no difference from urban respondents in employment status or quality of employment in adulthood. This suggests no interaction between early-onset drinking and residence.

Multivariable regression analysis compared employment outcomes across four groups: rural early-onset drinkers, rural later-onset drinkers, urban early-onset drinkers, and urban later-onset drinkers. Multivariable analysis held several characteristics of the respondent constant, to clarify the relationship among youth drinking, rural residence in youth, and adult employment. Demographic variables controlled in the analysis included race/ethnicity, sex, age in 1979 (the NLSY participants ranged in age from 14 through 21 in 1979), marital status in 1998, and years

of school in 1998. One ecological variable pertaining to youth exposure, physician/population ratio in the county of residence, was used as a proxy for the general availability of treatment services during the time the drinking behaviors occurred. Current (1998) area characteristics measured at the county level were held constant as these might affect the availability of employment and employment options. Current county characteristics included rural/urban status of the county of residence in 1998, the proportion of families in poverty, the proportion of persons with a college degree or more, the percent minority in the population, unemployment rate, and percent of the workforce in manufacturing.

Using the urban later-onset group as the reference group, only two comparisons were statistically significant: rural early-onset drinkers were more likely to receive irregular compensation (OR=1.34; CI=1.03, 1.75; p=0.0138); and rural later-onset drinkers were more likely to be employed (OR=3.24; CI=1.37, 7.67; p=0.0078; Table 5). The inconsistent nature of these results—rural, early onset youth drinkers do not uniformly fare worse than others—coupled with the lack of statistical significance in the interaction (paragraph above) suggest that rural youth are not at greater risk of poor outcomes than are their urban peers.

Youth Binge Drinking and Adult Employment

Binge drinking during youth does not appear to impact employment status in adulthood, but it may affect some employment quality measures. Respondents who reported binge drinking in their youth were just as likely as non-binge drinkers to be employed (96.4% vs. 96.6%; p<0.6096) but were more likely to work 40 or more hours per week (72.9% vs. 62.6%, p<0.0001). Early binge drinkers were also more likely than non-binge drinkers to report incomes lower than 125% of the poverty level (21.1% vs. 25.4%; p=0.0002) and irregular compensation

(30.9% vs. 24.8%; p<0.0001). Early binge drinking did not appear to affect job permanence, concurrent employment, or health benefits (Table 4).

Results from the multivariable analysis show an interaction between binge drinking and residence for employment status but not for any employment quality measure. Specifically, youth from rural areas who did not binge drink were more likely to be employed than urban youth who did not binge drink (OR=2.82; CI=1.25, 6.35; p=0012).

Persons who lived in rural areas during youth and reported binge drinking (OR=1.44, CI=1.12, 1.86; p=0.0049), and urban youth who binge drink (OR=1.24, CI=1.04, 1.49; p=0.0189), were both more likely to earn irregular compensation when compared to urban youth who did not binge drink. These results suggest an overall effect of early binge drinking on irregular employment, but no specifically rural effect on the effects of early binge drinking (Table 6).

Reported Alcohol Effects on Performance during Youth and Adult Employment

There were no significant differences in 1998 employment status or any employment quality measure between persons who reported during 1982-1984 that their work or school performance was adversely affected by drinking and persons who did not report such impact. Among youth whose work/school performance was affected by drinking, there were no rural / urban differences in adult employment status or employment quality measures (Table 4). Although denial of adverse effects is a common feature of alcohol addiction, strong associations between reported alcohol effects on work performance and dependency symptoms suggest that there was little reporting bias in the original survey, or at least consistent bias. Specifically, respondents with dependency related aggression symptoms and dependency related loss of control symptoms were more likely to report that their youth work performance was affected by

drinking (15.9% vs. 3.4%; p<0.0001 and 16.5% vs. 2.6%; p<0.0001). Respondents with dependency symptoms appear to be aware of the impact on their employment, which suggests that a reporting bias is unlikely.

Multivariable analysis that controlled for individual and county level demographics found two significant associations (Table 7). Specifically, rural youth whose drinking affected work/school performance were more likely to be employed (OR=4.59; CI=2.10, 10.05; p=0.0002) and earn irregular compensation (OR=1.33; CI=1.05, 1.69; p=0.0194) in 1998 than urban youth whose drinking did not impact performance. No significant differences were found for the other employment quality measures.

Dependency Related Aggression in Youth and Adult Employment

Respondents with alcohol dependency related aggression (DRA) symptoms in youth were more likely than those without DRA symptoms to work 40 or more hours per week (72.3% vs. 67.1, p=0.0028) and earn irregular compensation (32.4% vs. 26.9%, p=0.0017). DRA symptoms were not associated with employment status, income level, job permanence, concurrent employment, or health benefits (Table 4). Among those with DRA symptoms, rural respondents were more likely than urban respondents to have permanent employment (94.4% vs. 89.1%, p=0.0077) and earn irregular compensation (40.3% vs. 30.2%, p=0.0046). These results suggest an overall effect of DRA on employment quality and an interaction with residence on two of the six EQM measures.

Multivariable analysis also showed an interaction between DRA and residence for weekly working hours, compensation stability, and employment status (Table 8). Specifically, rural respondents with DRA symptoms were more likely than urban respondents without DRA symptoms to work 40 or more hours per week (OR=1.72; CI=1.11, 2.68; p=0.0160), earn

irregular compensation (OR=2.15; CI=1.53, 3.03; p<0.0001), and be employed (OR=15.44; 1.90, 125.79; p=0.0108).

Dependency Related Loss of Control and Employment

Respondents reporting alcohol dependency related loss of control symptoms (DRLC) during young adulthood were more likely than those without such symptoms to work 40 or more hours per week (74.2% vs. 66.2%, p<0.0001) and earn irregular compensation (32.6% vs. 26.5%, p=0.0009) and less likely to receive health benefits (76.6% vs. 80.4%, p=0.0097) in 1998. Among those with DRLC symptoms, rural respondents were more likely to earn less than 125% of poverty (31.0% vs. 22.7%, p=0.0077) and less likely to receive health benefits (69.2% vs. 78.0%, p=0.0101) than urban respondents. These results suggest an overall effect of DRLC on employment quality (Table 4).

Results from the multivariable analysis suggest an overall effect of DRLC on health insurance and income (Table 9). Compared to urban respondents without DRLC, urban residents appears to alleviate the effects of DRLC on employment status (OR=0.50; CI=0.32, 0.78; p=0.0024). Rural residents with DRLC were also more likely than urban residents without DRLC to earn income under 125% of poverty (OR=1.53; CI=1.01, 2.30; p=0.0437) and irregular income (OR=1.88; C=1.26, 2.79; p=0.0021), and the least likely to receive health benefits (OR=0.54; CI=0.35,0.84; p=0.0059).

Chapter 3: Conclusions

Discussion

This study investigated the prevalence of early drinking behaviors during youth, the relationship between these behaviors and adulthood employment outcomes, and the effect of residence on this relationship. The sections below discuss each of four research questions posed by this study:

1. **Were rural youth at higher risk of engaging in early drinking behaviors than urban youth in 1979-1984?**

Rural youth surveyed in 1979-1984 were just as likely as their urban counterparts to start drinking before the age of 18, binge drink before 18, and report that work or school was impacted by drinking. Rural youth were more likely to report 3 of 11 dependency-related symptoms: arguing heatedly while drinking, difficulty stopping drinking once begun, and loss of memory while 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. In fact, results from this analysis suggest that rural youth during the period studied may have had a somewhat higher risk of developing dependency related symptoms.

2. **Do rural and urban youth have the same employment outcomes in adulthood (1998)?**

Among the NLSY-79 cohort, respondents living in rural and urban areas during youth/young aduthood were equally likely to report being employed in 1998, but rural respondents were more likely to report participation in the workforce. Participation in the workforce reflects actively engaging in or seeking employment. Non participation may be voluntary (retired, homemakers, etc.) 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.

Of those actively employed, respondents who lived in rural areas during youth reported a lower overall quality of employment than urban respondents. Specifically, rural respondents were more likely to earn less than 125% of the federal poverty level, work more hours per week, earn irregular compensation (contracts, tips, and commission), and not receive health benefits.

3. Are early drinking behaviors associated with negative employment outcomes in adulthood?

This study first tested for associations between early drinking behaviors and adulthood employment outcomes. Four drinking behaviors during youth – early onset, binge drinking, dependency related aggression, and dependency related loss of control – were each positively associated with working more hours per week and earning irregular compensation in adulthood. Dependency related loss of control was also negatively associated with receiving health benefits. Reported effects of alcohol consumption on work or school performance during youth were not related to adulthood employment outcomes.

Results of this study supported earlier findings by the Substance Abuse and Mental Health Services Administration that found full-time workers drink more than part-time or unemployed workers (2001). Earlier findings linking income to alcohol consumption, however, did not emerge from this analysis. Although difficult to interpret, it appears that early drinking behavior does not affect overall employment status, but is associated with somewhat lower employment quality. Specifically, early onset drinking, binge drinking, and dependency symptoms during youth are each related to working more hours per week and having unstable

sources of income in adulthood. Also, youth who develop dependency-related loss of control symptoms will be less likely to receive health benefits in adulthood.

4. Is the association between early drinking behaviors and adulthood employment outcomes different among rural residents?

The effects of residence and early drinking behaviors on employment outcomes were tested using multivariable analysis controlling for several individual and county level demographics (see the Methods section in Appendix A for a complete list). Results from this analysis reveal two distinct patterns. First, respondents who resided in rural areas during youth who did not report early onset drinking, binge drinking, or work/school impacted by drinking were the group most likely to be employed in later adulthood. Surprisingly, however, rural residents reporting either dependency-related aggression or dependency-related loss of control were also more likely to be employed in later adulthood. This relationship is difficult to explain. One possible explanation is that aggressive behaviors are related to self-assertion, and loss of control is associated with risk taking; both assertiveness and risk taking might increase a person's success in a competitive work environment. However, further research will be needed to understand the dynamics of these relationships.

Overall, however, the relationships between residence, drinking behaviors, and employment quality show no fixed pattern. These findings suggest that residence does not affect the relationship between early drinking behaviors and the quality of employment in adulthood. Rural residence does not provide added risk or protection to the effects of drinking during youth on adulthood employment.

Limitations

This study was descriptive in nature and has many limitations for generalizing and extrapolating the results. Although the subsample is very similar to the total sample, it may not

be generalizable to the nation. In addition, although this study used data from multiple years, it is still impossible to determine a causal effect from this analysis. Bivariate analysis was generally used, so the relationships that were examined in this study do not include controls for standard demographic and socioeconomic factors. The current study used a MSA vs. non-MSA definition of rural which does not distinguish smaller towns from midsize cities. There are also many additional factors, not addressed in this analysis, that could have contributed to drinking behaviors, educational attainment, employment status or the relationships between these factors. These could 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 or not a person lived in a "dry" county (very common in the Southeast), 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 to produce non-biased results.

Conclusions

Urban and rural youth share pressures from multiple sources to engage in risky behaviors. Present findings, regarding behaviors from twenty years ago, parallel analysis of more recent data concerning teen exposure to violence and drug abuse, which was found to be as high or higher in rural areas when compared to urban and suburban settings (Mink, Moore, Johnson, Probst, 2005).

Reducing youth drinking, and thus its potential effects on adult employment status, requires multiple simultaneous approaches. The categorization of such strategies varies. The Center for Substance Abuse Prevention funds regional Centers for the Application of Prevention Technologies. The Northeast CAPT recommends a seven-point strategy that links policy, enforcement, collaboration, communication, education, early intervention, and alternative activities for youth (Northeast CAPT, 2005). For example, educational programs could be reinforced by enforcement of underage drinking and dram shop laws. (Dram shop laws penalize establishments if they sell alcohol to someone subsequently involved in a crash, and that person was either a minor or a visibly intoxicated person.) The Department of Justice expresses the specifics differently, but still stresses the need to link and coordinate the four basic approaches it recommends: limitations on access, expression of community norms, prevention of impaired driving, and use of school-based strategies. The key issue, for rural youth, is ensuring that programs are available to serve them in their home communities. Programs geared towards youth that address drinking or drug prevention, enforcement of appropriate behavior and, when necessary, recovery from alcohol or drug problems must be available to rural as well as urban youth. Our conclusions focus on these three areas.

Educational interventions such as the D.A.R.E. (Drug Abuse Resistance Education) curriculum, and other evidence-based programs, should be available in rural as well as urban

schools. To be effective, such programs must begin in the elementary school years, with additional materials at suitable grade levels available throughout middle and high school.

Rural schools may lack the staff, time and expertise to implement a K-12 alcohol and drug curriculum. However, such programs could be implemented using both collaborative partnering and telecommunications technology. State and local public health departments and departments responsible for substance abuse treatment and prevention often have outreach personnel available who could supplement school staff in assembling material and if needed, volunteers, to present alcohol education programs. Internet-based videoconferencing could be used to link rural schools with central providers of programs and educational offerings.

Conclusion: Rural school systems should partner with health care providers, mental health service providers, and community based advocacy groups such as Mothers Against Drunk Driving to ensure that all rural schools have alcohol and drug prevention education programs in place.

Alcohol dependence and early onset of drinking are both associated with a higher risk of driving under the influence and traffic collisions (Hingson & Winter, 2003). State and local policy, law and enforcement patterns can have a significant impact upon underage alcohol consumption. Policies such as beer taxation and state-controlled distribution of liquor have been shown to reduce the rate of alcohol dependence (Henderson, Liu, Diez Roux, & Link, 2004). Linked education / enforcement efforts that combine social marketing, media communications, and visibly increased law enforcement can reduce driving under the influence behavior among youth (Clapp, Johnson et al, 2005). Educational programs and interventions aimed at reducing driving under the influence should be geared towards all youth, but particularly rural youth who appear to exhibit higher levels of dependence.

Conclusion: Public safety officials in rural communities should pair with local healthcare institutions, mental and drug abuse service agencies, and community advocacy groups to implement linked educational and enforcement programs directed at youth.

Rural youth who exhibit signs of alcohol dependence have fewer resources available for their treatment than urban youth. The present study, youth behaviors occurring in the early 1980s, did not discover consistent rural disadvantages as regards overcoming any effects of early drinking problems. The availability of mental health and substance abuse specialists in rural areas has not improved since that time, and is likely to have declined in many areas. Thus, the ability of rural youth to obtain early intervention may be limited.

Earlier work carried out by the South Carolina Rural Health Research Center found that rural schools are more likely than urban institutions to take a punitive approach to inappropriate behaviors, such as violence. Further, when student education services targeting violence and drug use activities were available, they were implemented by staff who met lower hiring requirements, had less training, and were available fewer hours per week than in urban schools (Mink, Moore, Johnson, Probst, 2004). Overcoming these barriers and ensuring that rural youth receive appropriate intervention for alcohol problems will take significant community effort.

Conclusion: Rural school districts should pair with state and local mental health and substance abuse service providers to ensure adequate referral and treatment for youth with suspected alcohol or drug problems. Creative options for overcoming cost and distance barriers, such as tele-therapy, should be explored.

Recommendations for Future Research

- Further analysis needs to be done on the link between early onset of drinking and quality of employment among rural residents. Other factors, such as educational opportunities, employment opportunities, and economic infrastructure need to be taken into account. Even though this analysis did not find a significant link between early onset of drinking and income, the stability of income may be important.
- The apparent tendency for rural youth to exhibit higher alcohol dependence symptoms needs to be explored more fully. Factors such as environment, availability of alcohol, activity and leisure activities, income, and social influences may all affect rural youth differently than urban youth, leading to a higher rate of alcohol dependence.

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Appendix A: Methods

Data

This study used data from the National Longitudinal Survey of Youth 1979 (NLSY79). The 2000 Geocode dataset was used in this analysis and contains data from 1979 to 2000. The NLSY79 interviewed a nationally representative sample of 12,686 people who were between the ages of 14 and 22 in 1979. The NLSY79 followed this cohort annually until 1994, and then collected data every other year through 2000. This survey includes detailed information on a number of subjects, including alcohol consumption, employment, and education. More information on the NLSY79 is available at http://www.bls.gov/nls/79guide/2001/nls79g0.pdf.

Variables

The following variables were used in the primary analysis: rural/urban residential status in 1979, employment quality and income in 1998, age in 1979, age at first drink, ever binged, work impacted by drinking, abuse/dependency symptoms, and drinking behavior and binge drinking behavior in 1982, 1983, and 1984. The variables are defined below.

Rural status was measured for residence in 1979 and in 1998 and defined as living in a non-Metropolitan Statistical Area in 1979 or 1998. As to the interactions between rural/urban and the drinking, rural/urban was defined by the year that the exposure was taken, and then subjects were grouped into four categories: rural*drinking, rural*no drinking, urban*drinking, and urban*no drinking. Employment in 1998 was defined as a dichotomous variable, measured as either 1) employed and in the active service or 2) unemployed and not in the labor force. Although respondents who are not in the labor force are not actively seeking employment and may not have the same characteristics as those who are unemployed, this distinction does not matter for our purposes. Excessive and/or chronic drinking problems could lead to both unemployment and exiting from the labor force. Education in 1998 was also measured dichotomously and was defined by the number of years of education as of 1998. The variable was categorically defined as having 12 or fewer years of education and greater than 12 years of education. High school education is generally equal to completing 12 years of school, although this variable does not specifically measure high school graduation.

Many of the alcohol variables were derived as a combination of several variables in the dataset. Age at first drink was categorized as under 18, 18 or older, and never drank. Those who reported drinking in 1982 or 1983 were then asked the age at which they first started drinking (e.g., "having two or more drinks a week"). The respondents were coded according to the age they reported as under 18 years of age, and 18 years of age or older. Those who did not respond that they drank in 1982 and 1983 were followed to see if they responded as having a drink during the 30 days prior to the survey in 1984. If they responded yes to any of these questions, their age at first drink was coded as their age in the earliest year that they reported having a drink. If they responded no to all questions, their age at first drink was coded as never drank.

Drinking behavior was measured as not a current drinker or drank but didn't binge, and binge drank. Respondents were asked if they had a drink within the last 30 days for the years 1982, 1983, and 1984. Respondents were then asked how often during the last 30 days they had six or more drinks on one occasion for the same years. If respondents did not report drinking during any of these years they were coded as not a current drinker. If they responded as binging one or more times in any of these years, they were coded as binge drinkers. If respondents

reported having at least one drink but not binging, they were classified as drank but did not binge or moderate drinkers. Those respondents who were missing drinking variables for five or more years were categorized as missing.

Work impacted was defined as a two level variable using a positive response to any of the following questions in 1982, 1983, and 1984 versus negative on all: drinking ever interfered with schoolwork or drinking ever interfered with job. Presence of abuse/dependency symptoms includes alcohol related aggression and loss of control. Alcohol related aggression was defined by a positive response to any of the following: felt aggressive/cross while drinking, got into heated argument, or got into a fight while drinking. Alcohol related loss of control was defined by a positive response to any of the following: afraid might be/become alcoholic, difficult to stop until completely intoxicated, often take a drink first thing in the morning, hands shake in the morning, gotten high or tight when drinking by yourself, kept on drinking after you promised yourself not to, can't remember activity while drunk, or tried to cut down or quit drinking but failed. All of the dependency symptoms were measured from 1984.

Employment related measures were defined as a two level variable using the following questions in 1998: employed vs. unemployed (for those who in labor force), household income < 125% of poverty level or not, full vs. part time (working 40 or more hours per week or not), regular vs. temporary job, receiving overtime pay, tips or commissions or not, receiving health insurance or not, and having >=2 jobs or not.

Since the exposure occurred (during 1982-1984) before employment quality measured from 1998, the present study can decide its temporal relationship.

Analysis

Only those respondents present for the 1998 survey were included in the bivariate and multivariable analyses, leaving a sample of 8,399 respondents for the analysis. The analysis used SAS and SUDAAN software packages. The 1998 sampling weights were used for the outcome measures. All percentages were compared using Chi-Square analyses for categorical data. Logistic regression was used to predict employment status in 1998, holding constant the following group of variables:

A) Respondents grouped by the interaction between drinking behaviors (early onset drinking, binging, work impacted, and abuse dependency symptoms) and residence when exposed: rural*drinking, rural*no drinking, urban*drinking, and urban*no drinking

B) Demographics: race/ethnicity, sex, age in 1979, marital status in 1998, and years of school in 1998

C) Physician rate per 100,000 persons in the year when the exposure was taken. Physician / population ratio is used as a proxy for the general availability of treatment resources in the community at the time the respondent may have been engaged in inappropriate alcohol consumption.

D) Area characteristics in 1998 (county of residence): rural residence, % families in poverty, % persons with college degree or more, % minority, unemployment rate, % workforce in manufacturing. These ecological factors are added to the model to control for job availability in the respondent's current residence.

Because multiple predictors were tested against multiple outcomes, the possibility of Type II error had to be considered. Significance for purposes of this report was set at alpha ≤ 0.02.

Appendix B: Data Tables

Table 1: Descriptive Statistics, Total Sample vs. Subsample

	Rural		**Urban**		
	Total Sample, 1979 (observations and weighted percents)				
Variable	Unwt'd N	Wt'd %	Unwt'd N	Wt'd %	p-value
Mean Age	17.7	--	17.8	--	0.0734
Sex					0.3548
Male	1720	51.0	3866	49.6	
Female	1746	49.0	4087	50.4	
Race/Ethnicity					***0.0418***
Hispanic	356	3.5	1567	7.5	
Black	796	10.8	2134	15.1	
Non-Black, non-Hispanic	2314	85.7	4252	77.4	
Residence	3466	29.1	7953	70.9	***0.0000***
Poverty status,					0.3286
Not in poverty	2136	82.9	5391	85.2	
In Poverty	1140	17.1	2126	14.8	
	1984 sample (observations and weighted percents)				
Mean Age	22.6	--	22.8	--	***0.0004***
Sex					0.4128
Male	762	49.8	2662	48.4	
Female	833	50.2	3082	51.6	
Race/Ethnicity					***0.0368***
Hispanic	192	3.4	1208	7.2	
Black	443	10.4	1761	14.9	
Non-Black, non-Hispanic	960	86.2	2775	77.9	
Residence	1595	22.4	5744	77.6	--
Poverty status,					***0.0001***
Not in poverty	1054	78.0	4186	85.8	
In Poverty	426	22.0	1095	14.2	
	1998 sample (observations and weighted percents)				
Mean Age	36.8	--	36.7	--	0.1279
Sex					0.6351
Male	752	51.1	3236	50.3	
Female	794	48.9	3442	49.7	
Race/Ethnicity					***0.0004***
Hispanic	150	2.9	1415	7.4	
Black	378	8.7	2112	15.6	
Non-Black, non-Hispanic	1018	88.4	3151	77.0	
Residence	1546	21.0	6678	79.0	***0.0000***
Poverty status,					0.6001
Not in poverty	1148	92.0	4821	91.5	
In Poverty	137	8.0	611	8.5	

* Those who were in active forces in 1979 (n=175) were not shown in this table.

Bold/italics = significant at p<0.05

Table 2: Drinking Behaviors, 1982-1984, by residence

	All	Rural		Urban		
Drinking behaviors	**%**	**%**	**SE**	**%**	**SE**	**p-value**
First drink (before 18 years of age)	47.6	46.5	2.1	48.0	0.9	0.5158
Binge drinking	55.3	53.2	2.8	55.9	1.2	0.3526
Work/school impacted	9.7	10.6	1.1	9.3	0.5	0.2658
Dependency: Aggression	19.7	19.7	1.7	19.7	0.8	0.9965
Cross while drinking	19.3	20.3*	1.3	19.1	0.8	0.4026
Heated argument while drinking	17.6	20.6*	1.4	16.9	0.7	***0.0190***
Fought while drinking	8.4	10.5	1.3	7.9	0.5	0.0588
Dependency: Loss of Control	23.5	22.8	1.6	23.8	0.7	0.5768
Tried to quit but failed	6.6	8.1	1.1	6.2	0.5	0.1009
Afraid might me alcoholic	5.7	6.5	1.0	5.5	0.5	0.3306
Difficult to stop until drunk	5.3	7.5	1.0	4.8	0.4	***0.0125***
Loss of memory while drinking	16.5	20.0	1.6	15.6	0.7	***0.0109***
Drink first thing in the morning	2.1	2.7	0.6	1.9	0.2	0.2582
Hand shakes morning after drinking	4.4	4.1	0.7	4.4	0.4	0.6160
Get high while alone	9.7	10.7	1.4	9.5	0.6	0.3944
Kept drinking after promises to stop	8.5	10.4	1.3	8.0	0.5	0.0989

* Numbers are calculated using 1998 sampling weights. Analysis is limited to individuals who provided employment data in 1998.
Bold/italics = significant at p<0.02

Table 3: Adulthood employment characteristics, by residence (1998)

	All	Rural		Urban		
Employment outcome measures	**%**	**%**	**SE**	**%**	**SE**	**p-value**
Workforce participation						***0.0061***
In workforce	86.0	88.5	0.9	85.3	0.6	
Out of workforce	14.0	11.5	0.9	14.7	0.6	
Employment (those in workforce)						0.2739
Employed	96.4	97.0	0.5	96.3	0.3	
Unemployed	3.6	3.0	0.5	3.7	0.3	
Household Income level						***0.0099***
Over 125% of poverty	76.7	73.4	1.4	77.6	1.0	
At or under 125% of poverty	23.3	26.6	1.4	22.4	1.0	
Weekly Work Hours						***0.0048***
Full-time (40 hours or more)	67.8	72.0	1.6	66.6	0.8	
Part-time (less than 40 hours)	32.2	28.0	1.6	33.4	0.8	
Job Permanence						0.0767
Permanent employee	92.3	93.5	0.8	91.9	0.4	
Temporary/contract employee	7.7	6.5	0.8	8.1	0.4	
Compensation						0.0254
Commission, contract, or tips	27.9	30.7	1.4	27.0	0.8	
None	72.1	69.3	1.4	73.0	0.8	
Concurrent Employment						0.1376
Only 1 job	75.2	73.9	1.4	76.2	0.7	
2 or more jobs	24.8	26.1	1.4	23.8	0.7	
Health Insurance Benefits						0.0244
Provided by employer	79.5	77.0	1.3	80.2	0.7	
Not provided by employer	20.5	23.0	1.3	19.7	0.7	

Numbers are calculated using 1998 sampling weight.
Bold/italics = significant at p<0.02

Table 4: Drinking Behaviors, Residence, and Employment Outcomes

	Proportion reporting each employment outcome by drinking behavior during youth			*Proportion reporting each employment outcome by risk behavior and residence*		
	Early	**Not Early**		**Early onset drinking**		
Employment Outcomes	**Onset**	**Onset**	**p-value**	**Rural**	**Urban**	**p-value**
Employed	96.3	96.7	0.3772	96.0	96.2	0.7801
With income <125% of poverty	23.3	22.9	0.6969	24.5	22.9	0.3969
Working 40+ hours per week	70.9	65.9	***0.0003***	73.3	70.0	0.1803
Permanent employment	91.4	92.6	0.1551	92.8	91.1	0.1629
Irregular compensation	30.7	25.9	***0.0001***	31.4	30.0	0.4788
2+ jobs at once	25.0	23.7	0.2339	24.3	25.1	0.6978
Receiving health benefits	78.7	80.4	0.1617	77.8	78.4	0.7705
	Binge	**Not Binge**		**Binge Drinking**		
Employment Outcomes	**Drinking**	**Drinking**	**p-value**	**Rural**	**Urban**	**p-value**
Employed	96.4	96.6	0.6096	96.4	96.2	0.7883
With income <125% of poverty	21.1	25.4	***0.0002***	23.9	20.1	0.0325
Working 40+ hours per week	72.9	62.6	***0.0000***	74.3	72.6	0.4238
Permanent employment	91.8	92.3	0.5802	92.6	91.7	0.4603
Irregular compensation	30.9	24.8	***0.0000***	31.7	30.4	0.4996
2+ jobs at once	24.3	24.4	0.9430	26.3	23.3	0.1229
Receiving health benefits	79.7	79.5	0.8792	77.9	80.1	0.2195
	Work	**Work Not**		**Work Impacted**		
Employment Outcomes	**Impacted**	**Impacted**	**p-value**	**Rural**	**Urban**	**p-value**
Employed	97.1	96.4	0.3053	98.0	96.7	0.4016
With income <125% of poverty	21.5	23.2	0.3755	21.9	20.6	0.7662
Working 40+ hours per week	70.6	68.0	0.1849	71.5	70.0	0.7722
Permanent employment	92.8	92.0	0.5014	92.4	93.1	0.8046
Irregular compensation	30.0	28.0	0.3681	28.7	29.2	0.9105
2+ jobs at once	23.8	24.6	0.3319	23.9	20.5	0.3592
Receiving health benefits	77.2	79.8	0.2281	81.1	76.1	0.2785
		No		**Aggression**		
Employment Outcomes	**Aggression**	**Aggression**	**p-value**	**Rural**	**Urban**	**p-value**
Employed	96.0	96.5	0.4618	97.6	95.3	0.0841
With income <125% of poverty	23.7	23.1	0.7007	28.3	22.5	0.1361
Working 40+ hours per week	72.3	67.1	***0.0028***	77.8	71.1	0.0564
Permanent employment	90.6	92.5	0.0607	94.4	89.1	***0.0077***
Irregular compensation	32.4	26.9	***0.0017***	40.3	30.2	***0.0046***
2+ jobs at once	23.8	24.6	0.6099	25.2	23.3	0.5457
Receiving health benefits	77.6	79.9	0.1405	74.9	77.7	0.4264
	Loss of	**No Loss of**		**Loss of Control**		
Employment Outcomes	**Control**	**Control**	**p-value**	**Rural**	**Urban**	**p-value**
Employed	95.7	96.7	0.1171	97.3	95.3	0.1035
With income <125% of poverty	24.2	22.8	0.2836	31.0	22.7	***0.0077***
Working 40+ hours per week	74.2	66.2	***0.0000***	78.1	72.8	0.1331
Permanent employment	91.5	92.3	0.3760	93.5	91.4	0.1884
Irregular compensation	32.6	26.5	***0.0009***	37.7	30.9	0.0599
2+ jobs at once	24.8	24.4	0.7724	23.1	24.2	0.7392
Receiving health benefits	76.6	80.4	***0.0097***	69.2	78.0	***0.0101***

Numbers are calculated using 1998 sampling weights. ***Bold/italics = significant at p<0.02***

Table 5: Multivariable regression analyses for early onset drinking and residence as factors affecting employment outcomes

		Simplified Model [1]				Adjusted Model [2]			
			95% CI				95% CI		
Employment Quality Measure	**Predictors**	**OR** [3]	**lower**	**upper**	**p-value**	**OR** [3]	**lower**	**upper**	**p-value**
Employed	Rural * Early Onset	0.95	0.58	1.55	0.8228	1.43	0.55	3.72	0.4598
	Rural * Later Onset	1.69	1.06	2.70	0.0268	3.24	1.37	7.67	***0.0078***
	Urban * Early Onset	1.01	0.73	1.40	0.9481	0.84	0.55	1.29	0.4282
With income under 125% of poverty	Rural * Early Onset	1.14	0.93	1.40	0.2052	0.85	0.61	1.18	0.3303
	Rural * Later Onset	1.25	1.04	1.52	0.0201	0.90	0.64	1.27	0.5471
	Urban * Early Onset	1.04	0.92	1.19	0.5140	0.96	0.79	1.16	0.6899
Working 40+ hours per week	Rural * Early Onset	1.54	1.22	1.94	***0.0003***	1.03	0.76	1.40	0.8278
	Rural * Later Onset	1.24	1.05	1.46	***0.0128***	1.02	0.80	1.31	0.8582
	Urban * Early Onset	1.31	1.13	1.52	***0.0005***	1.04	0.87	1.25	0.6825
With permanent employment	Rural * Early Onset	1.06	0.75	1.49	0.7604	0.99	0.61	1.60	0.9628
	Rural * Later Onset	1.11	0.77	1.58	0.5793	0.88	0.55	1.40	0.5812
	Urban * Early Onset	0.84	0.66	1.07	0.1567	0.84	0.63	1.13	0.2424
Earning irregular compensation	Rural * Early Onset	1.41	1.17	1.71	***0.0004***	1.34	1.03	1.75	0.0318
	Rural * Later Onset	1.22	1.01	1.48	0.0425	1.18	0.91	1.52	0.2070
	Urban * Early Onset	1.32	1.16	1.50	***0.0000***	1.10	0.95	1.27	0.2149
Working 2+ jobs at once	Rural * Early Onset	1.11	0.91	1.36	0.3041	0.86	0.64	1.15	0.3150
	Rural * Later Onset	1.25	1.04	1.51	***0.0182***	1.15	0.86	1.55	0.3449
	Urban * Early Onset	1.15	0.99	1.34	0.0591	1.15	0.95	1.41	0.1553
With health benefits	Rural * Early Onset	0.79	0.61	1.03	0.0764	0.85	0.60	1.20	0.3437
	Rural * Later Onset	0.77	0.61	0.98	0.0373	0.90	0.65	1.24	0.5014
	Urban * Early Onset	0.82	0.69	0.98	0.0248	0.80	0.64	1.00	0.0499

[1] Contains only Rural/Urban * Early/Later Onset. [2] Includes residence and drinking pattern plus all control variables.

Numbers are calculated using 1998 sampling weight.

Bold/italics = significant at p<0.02

Table 6: Multivariable regression analyses for binge drinking and residence as factors affecting employment outcomes

		Simplified Model [1]				Adjusted Model [2]			
			95% CI				95% CI		
Employment Quality Measure	**Predictors**	**OR** [3]	**lower**	**upper**	**p-value**	**OR** [3]	**lower**	**upper**	**p-value**
Employed	Rural * Binge	1.04	0.57	1.88	0.8994	1.06	0.40	2.79	0.9019
	Rural * Not Binge	1.35	0.82	2.20	0.2334	2.82	1.25	6.35	***0.0123***
	Urban * Binge	0.96	0.71	1.30	0.8059	0.70	0.47	1.05	0.0873
With income under 125% of poverty	Rural * Binge	0.93	0.74	1.16	0.5098	0.84	0.60	1.19	0.3363
	Rural * Not Binge	1.10	0.90	1.34	0.3647	0.81	0.58	1.13	0.2173
	Urban * Binge	0.74	0.64	0.85	***0.0000***	0.84	0.67	1.06	0.1370
Working 40+ hours per week	Rural * Binge	1.90	1.56	2.31	***0.0000***	1.17	0.87	1.56	0.2982
	Rural * Not Binge	1.34	1.09	1.64	***0.0047***	1.06	0.79	1.42	0.7200
	Urban * Binge	1.74	1.52	1.99	***0.0000***	1.17	0.98	1.39	0.0786
With permanent employment	Rural * Binge	1.10	0.75	1.61	0.6263	1.00	0.63	1.59	0.9844
	Rural * Not Binge	1.23	0.81	1.86	0.3293	1.08	0.66	1.75	0.7602
	Urban * Binge	0.96	0.74	1.24	0.7662	1.06	0.79	1.41	0.7173
Earning irregular compensation	Rural * Binge	1.49	1.24	1.80	***0.0000***	1.44	1.12	1.86	***0.0049***
	Rural * Not Binge	1.25	1.02	1.54	0.0335	1.32	0.98	1.76	0.0666
	Urban * Binge	1.41	1.22	1.63	***0.0000***	1.24	1.04	1.49	***0.0189***
Working 2+ jobs at once	Rural * Binge	1.11	0.89	1.38	0.3418	0.92	0.65	1.29	0.6212
	Rural * Not Binge	1.01	0.81	1.27	0.9107	0.94	0.67	1.31	0.7067
	Urban * Binge	0.94	0.81	1.10	0.4699	0.91	0.75	1.11	0.3644
With health benefits	Rural * Binge	0.89	0.71	1.12	0.3115	0.89	0.63	1.26	0.5207
	Rural * Not Binge	0.87	0.67	1.14	0.3200	1.03	0.73	1.47	0.8553
	Urban * Binge	1.01	0.87	1.19	0.8602	0.98	0.80	1.19	0.8092

[1] Using only Rural/Urban * Binge/Not Binge. [2] Including all control variables.
Numbers are calculated using 1998 sampling weight.
Bold/italics = significant at p<0.02

Table 7: Multivariable regression analyses for work/school impacted by drinking and residence as factors affecting employment outcomes

		Simplified Model [1]				Adjusted Model [2]			
			95% CI				95% CI		
Employment Quality Measure	**Predictors**	**OR** [3]	**lower**	**upper**	**p-value**	**OR** [3]	**lower**	**upper**	**p-value**
Employed	Rural * Work Impacted	1.99	0.62	6.43	0.2495	1.57	0.42	5.80	0.4997
	Rural * Not Impacted	1.37	0.92	2.04	0.1187	4.59	2.10	10.05	***0.0002***
	Urban * Work Impacted	1.19	0.67	2.11	0.5605	0.79	0.39	1.60	0.5152
With income under 125% of poverty	Rural * Work Impacted	0.95	0.60	1.49	0.8108	0.86	0.43	1.72	0.6675
	Rural * Not Impacted	1.18	1.00	1.40	0.0505	0.82	0.60	1.10	0.1881
	Urban * Work Impacted	0.88	0.67	1.15	0.3377	0.78	0.54	1.14	0.1973
Working 40+ hours per week	Rural * Work Impacted	1.27	0.83	1.94	0.2711	1.29	0.70	2.37	0.4073
	Rural * Not Impacted	1.23	1.05	1.44	***0.0105***	1.03	0.80	1.31	0.8425
	Urban * Work Impacted	1.18	0.93	1.50	0.1713	0.94	0.69	1.27	0.6666
With permanent employment	Rural * Work Impacted	1.12	0.55	2.26	0.7585	1.04	0.39	2.76	0.9354
	Rural * Not Impacted	1.25	0.93	1.69	0.1349	0.99	0.66	1.49	0.9528
	Urban * Work Impacted	1.24	0.79	1.94	0.3444	1.44	0.82	2.52	0.2060
Earning irregular compensation	Rural * Work Impacted	1.11	0.75	1.64	0.5984	1.27	0.78	2.06	0.3329
	Rural * Not Impacted	1.22	1.07	1.41	***0.0044***	1.33	1.05	1.69	***0.0194***
	Urban * Work Impacted	1.14	0.87	1.49	0.3412	1.09	0.80	1.48	0.5990
Working 2+ jobs at once	Rural * Work Impacted	1.00	0.70	1.42	0.9946	0.65	0.37	1.12	0.1166
	Rural * Not Impacted	1.12	0.96	1.31	0.1584	0.99	0.74	1.33	0.9511
	Urban * Work Impacted	0.82	0.63	1.06	0.1299	0.85	0.64	1.13	0.2703
With health benefits	Rural * Work Impacted	1.05	0.65	1.70	0.8341	1.36	0.71	2.62	0.3568
	Rural * Not Impacted	0.83	0.70	1.00	0.0461	0.96	0.72	1.27	0.7603
	Urban * Work Impacted	0.78	0.58	1.04	0.0934	0.71	0.50	1.01	0.0578

[1] Using only Rural/Urban * Binge/Not Binge. [2] Including all control variables.
Numbers are calculated using 1998 sampling weight.
Bold/italics = significant at p<0.02

Table 8: Multivariable regression analyses for dependency-related aggression and residence as factors affecting employment outcomes

		Simplified Model [1]				Adjusted Model [2]			
			95% CI				95% CI		
Employment Quality Measure	**Predictors**	**OR** [3]	**lower**	**upper**	**p-value**	**OR** [3]	**lower**	**upper**	**p-value**
Employed	Rural * Aggression	1.47	0.59	3.69	0.4098	15.44	1.90	125.79	***0.0108***
	Rural * No Aggression	1.10	0.74	1.63	0.6457	1.91	0.88	4.16	0.1016
	Urban * Aggression	0.73	0.49	1.07	0.1056	0.59	0.35	1.00	0.0501
With income under 125% of poverty	Rural * Aggression	1.37	0.95	1.98	0.0913	1.17	0.66	2.07	0.5938
	Rural * No Aggression	1.23	1.01	1.50	***0.0371***	0.93	0.66	1.30	0.6697
	Urban * Aggression	1.01	0.84	1.21	0.9401	0.91	0.70	1.18	0.4811
Working 40+ hours per week	Rural * Aggression	1.84	1.33	2.55	***0.0003***	1.72	1.11	2.68	***0.0160***
	Rural * No Aggression	1.26	1.03	1.54	0.0229	1.04	0.77	1.41	0.7943
	Urban * Aggression	1.30	1.08	1.56	***0.0060***	1.06	0.84	1.34	0.6004
With permanent employment	Rural * Aggression	1.35	0.81	2.26	0.2494	0.82	0.46	1.48	0.5152
	Rural * No Aggression	1.11	0.81	1.52	0.5132	0.80	0.52	1.22	0.2951
	Urban * Aggression	0.66	0.49	0.88	***0.0053***	0.71	0.50	1.01	0.0573
Earning irregular compensation	Rural * Aggression	1.90	1.51	2.38	***0.0000***	2.15	1.53	3.03	***0.0000***
	Rural * No Aggression	1.11	0.94	1.31	0.2228	1.18	0.89	1.57	0.2507
	Urban * Aggression	1.22	1.02	1.46	0.0305	1.09	0.87	1.35	0.4543
Working 2+ jobs at once	Rural * Aggression	1.07	0.77	1.50	0.6764	0.71	0.46	1.10	0.1236
	Rural * No Aggression	1.14	0.95	1.36	0.1500	0.91	0.70	1.20	0.5130
	Urban * Aggression	0.97	0.79	1.19	0.7461	0.93	0.73	1.20	0.5886
With health benefits	Rural * Aggression	0.70	0.49	1.01	0.0558	0.85	0.50	1.43	0.5329
	Rural * No Aggression	0.81	0.68	0.98	0.0301	0.94	0.70	1.27	0.6862
	Urban * Aggression	0.82	0.67	1.01	0.0686	0.85	0.66	1.10	0.2095

[1] Using only Rural/Urban * Binge/Not Binge. [2] Including all control variables.
Numbers are calculated using 1998 sampling weight.
Bold/italics = significant at p<0.02

Table 9: Multivariable regression analyses for dependency-related loss of control and residence as factors affecting employment outcomes

		Simplified Model [1]				Adjusted Model [2]			
			95% CI				95% CI		
Employment Quality Measure	**Predictors**	**OR** [3]	**lower**	**upper**	**p-value**	**OR** [3]	**lower**	**upper**	**p-value**
Employed	Rural * Loss of Control	1.31	0.61	2.81	0.4903	5.18	1.05	25.57	0.0435
	Rural * No Loss of Control	1.10	0.74	1.65	0.6372	1.77	0.80	3.94	0.1598
	Urban * Loss of Control	0.73	0.51	1.06	0.0970	0.50	0.32	0.78	***0.0024***
With income under 125% of poverty	Rural * Loss of Control	1.57	1.22	2.03	***0.0006***	1.53	1.01	2.30	0.0437
	Rural * No Loss of Control	1.18	0.97	1.44	0.0886	0.84	0.60	1.19	0.3346
	Urban * Loss of Control	1.02	0.86	1.21	0.7777	0.99	0.79	1.25	0.9441
Working 40+ hours per week	Rural * Loss of Control	1.95	1.35	2.80	***0.0004***	1.56	1.00	2.44	0.0515
	Rural * No Loss of Control	1.28	1.08	1.53	***0.0059***	1.06	0.79	1.42	0.6977
	Urban * Loss of Control	1.46	1.25	1.70	***0.0000***	1.10	0.92	1.33	0.2874
With permanent employment	Rural * Loss of Control	1.24	0.79	1.94	0.3538	0.87	0.48	1.59	0.6601
	Rural * No Loss of Control	1.25	0.89	1.74	0.1946	0.89	0.61	1.30	0.5482
	Urban * Loss of Control	0.92	0.70	1.20	0.5424	1.08	0.79	1.49	0.6297
Earning irregular compensation	Rural * Loss of Control	1.74	1.31	2.32	***0.0002***	1.88	1.26	2.79	***0.0021***
	Rural * No Loss of Control	1.15	0.96	1.37	0.1219	1.22	0.91	1.64	0.1831
	Urban * Loss of Control	1.29	1.08	1.54	***0.0056***	1.13	0.92	1.39	0.2359
Working 2+ jobs at once	Rural * Loss of Control	0.97	0.70	1.34	0.8606	0.71	0.48	1.06	0.0975
	Rural * No Loss of Control	1.20	1.00	1.43	0.0475	0.94	0.73	1.21	0.6360
	Urban * Loss of Control	1.03	0.86	1.23	0.7355	1.00	0.81	1.23	0.9721
With health benefits	Rural * Loss of Control	0.53	0.39	0.72	***0.0001***	0.54	0.35	0.84	***0.0059***
	Rural * No Loss of Control	0.90	0.72	1.11	0.3135	1.09	0.78	1.52	0.6074
	Urban * Loss of Control	0.83	0.69	1.01	0.0616	0.80	0.65	0.99	0.0398

[1] Using only Rural/Urban * Binge/Not Binge. [2] Including all control variables.
Numbers are calculated using 1998 sampling weight. ***Bold/italics = significant at p<0.02***