
Predictors of Alcohol Use Among Rural Adolescents

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ABSTRACT: *There is increasing evidence that alcohol use is becoming more common during childhood and early adolescence. However, little is known about alcohol use among rural youths. This article reports a study of alcohol use among 367 fifth-grade students in two rural South Carolina school districts. More than one third (n=131) of the fifth graders reported having used alcohol. Of these, 34 percent (n=44) reported drinking during the previous month; 8 percent had been intoxicated during the previous two months; and 54 percent reported drinking in the home with or without parental approval. Logistic regression analysis was used to determine the predictors of alcohol use by fifth graders. The results indicated that gender (OR=2.82), mother's alcohol use (OR=1.86), father's alcohol use (OR=2.13), and smoking (OR=8.30) were significantly associated with alcohol use. The findings suggest that prevention programs address cigarette smoking and drinking behaviors of parents to reduce alcohol use and the acquisition of other health compromising behavior by youths. Early intervention approaches must go beyond the schools and target families as well as community populations.*

Adolescence is often viewed as a period of optimal health. However, adolescents are the only age group whose mortality rate has increased in the past 25 years (Vernon, 1991). There is growing concern regarding both the immediate and long-term effects of health-damaging behavior initiated during early adolescence. Alcohol use is a behavior that has become more common among children and early adolescents (Beauvais & LaBoueff, 1985; Castiglia, 1992; Long & Boik, 1993; Millstein, Irwin, Adler, Cohn, & Kegeles, 1992; Okwumaboa & Duryea, 1987; Welte & Barnes, 1985). Studies of substance use suggest that a history of longer use and increasing levels of use place adolescents at risk for more serious problems (Bailey, 1992; Fleming, Leventhal, Glynn, & Ershler, 1989). Because alcohol use contributes to thousands of preventable deaths among adolescents,

prevention programs are essential (Department of Health and Human Services [DHHS], 1990). However, for such programs to succeed, it is important to identify the risks and protective factors associated with the early onset of drinking behavior among preadolescents in both urban and rural areas.

Studies of prevalence of alcohol use among rural youths suggest that use rates are equal to those in urban areas (Gibbons, Wylie, Echterling, & French, 1986; Long & Boik, 1993). A study of rural students in a mid-Atlantic state found that 83 percent of seventh through 12th graders had used alcohol. Forty-six percent of boys and 21 percent of girls had their first drink by age 10. Of the senior students, 13 percent were classified as heavy drinkers (Gibbons, et al., 1986). A survey of the same age group in New York state revealed 71 percent to be drinkers and 13 percent to be heavy drinkers (Barnes & Welte, 1986).

Among youths in rural Ohio, heavy drinking ("drank until drunk or passed out") was reported by 2 percent of fifth graders while 10 percent reported daily, weekly, or monthly alcohol use (Teets, 1991). In a rural Texas town, almost 10 percent of third, fourth, and fifth graders reported having tried alcohol (McBroom, 1992).

A number of demographic and perceived environmental factors have been shown to be related to alcohol use in adolescents. It is known that heavy drinking increases with age, and boys tend to drink greater quantities as well as more frequently than girls (Barnes & Welte, 1986; Gibbons et al., 1986; Long & Boik, 1993; Okwumaboa & Duryea, 1987; Sarvela & McClendon, 1988; South Carolina Commission on Alcohol and Drug Abuse, 1993, 1994; Teets, 1991). A reversal in this gender drinking pattern was noted among ninth-grade Icelandic adolescents; female youths were found to drink more frequently than male youths (Thorlindsson & Vilhjalmsson, 1991). Comparisons of drinking patterns between races indicate that white adolescents have a higher use rate than black adolescents (Barnes & Welte, 1986; Castiglia, Glenister, Haughey, & Kanski, 1989; Millstein, et al., 1992; South Carolina Commission on Alcohol and Drug Abuse, 1993, 1994; Thompson & Wilsnack, 1987).

Peer and parental alcohol use and attitude toward drinking have been shown to influence adolescent drinking behavior (Barnes & Welte, 1986; Millstein, et al., 1992; Thompson & Wilsnack, 1987; Thorlindsson & Vilhjalmsson, 1991). The relationship between parental modeling and adolescent alcohol use varies from study to study; however, some authors have found parental modeling to be a predictor of early onset of alcohol use (Kandel & Andrews, 1987; Quine & Stephenson, 1990; Thompson & Wilsnack, 1987). Bahr, Marcos, and Maughan (1995) recently reported that the number of adolescents with friends who drink tends to increase as they grow older and when family members abuse alcohol. However, after accounting for the effects of peers, their data did not support direct learning of alcohol use from family members. Other researchers suggest that only father's, not mother's, drinking behavior influences onset of alcohol use (Brook, Whiteman, Gordon, Nomura, & Brook, 1986). And, it also has been reported that parental modeling and attitude toward alcohol use have no influence on adolescent use (Ary, Tildesley, Hops, & Andrews, 1993).

Tobacco smoking also has been identified as the point of introduction to alcohol and other drug use

(Welte & Barnes, 1985). Alcohol use and tobacco smoking are strongly correlated and tend to cluster with other problem behaviors (Donovan & Jessor, 1985; Millstein, et al., 1992; Sussman, Dent, Flay, Hansen, & Johnson, 1987; Thorlindsson & Vilhjalmsson, 1991). Alcohol and marijuana use have commonalities. It has been suggested that exposure to peers who use marijuana can significantly influence alcohol use (Ellickson & Hays, 1991; Napier, Carter, & Pratt, 1981).

Few studies have examined the relationship between physical activity and alcohol use in preadolescents. Faulkner and Slattery (1990) found a positive association between physical activity and alcohol use among high school boys but not among girls. Further, use patterns among high school athletes were shown to be similar to those of students who did not play sports (Rooney, 1984; Teets, 1991). In contrast, sports participation was associated with low alcohol use in sixth-grade students (Hastad, Segrave, Pangrazi, & Peterson, 1984).

The existing literature on the prevalence of alcohol use in rural areas and associated factors is by no means exhaustive. The extent to which the factors reviewed influence preadolescent alcohol use behavior is not clear. The purposes of this investigation were to describe the prevalence of alcohol use and to examine whether demographic variables (age, race, gender), environmental factors (alcohol and tobacco use by father, mother, and best friend), and personal behavior factors (tobacco smoking and physical activity) predict alcohol use among rural fifth-grade students. This investigation is part of a continuing prospective intervention study designed to examine the effects of an after-school and summer program on physical activity and selected health behaviors of rural adolescents. The study described here was conducted prior to the initiation of the intervention phase of the larger project.

Conceptual Framework

Jessor's (1992) Adolescent Risk Behavior Model provided the organizing framework for this study. This comprehensive multidirectional model consists of five interrelated risk domains that directly, as well as indirectly, influence risk behaviors that, in turn,

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determine health-compromising outcomes. Each of the five risk domains (biology/genetics, social environment, perceived environment, personality, and behavior) include both risk factors and protective factors. The risk behaviors component of the model contains three content categories, i.e., problem behavior, health-related behavior, and school behavior. Taken together, risk domains and risk behaviors determine health/life-compromising outcomes.

This study focused on the risk behaviors component of the model to determine the extent to which selected risk and protective factors representing the perceived environment (parental and peer behavior), personal behavior (tobacco smoking and physical activity), and demographic characteristics predict alcohol use.

Methods

Sample. Subjects were recruited from fifth-grade classes in five schools located in two school districts in rural South Carolina. Recruitment took place in the primary classroom, making it possible for all students to participate. The participation rate from the five schools was 76 percent. Standard guidelines for the ethical treatment of human subjects were followed. Officials in the school districts and in each school gave permission to conduct the study. Parents or guardians gave informed consent, and each child gave assent.

Data were collected from 422 fifth-grade students. However, missing information on the environmental or personal behavior factors resulted in the exclusion of 55 respondents (13%). The sample for this study consisted of 367 subjects. The descriptive statistics indicated that the characteristics of the sample remained unchanged by the exclusion of subjects. The sample was 73 percent black and 51 percent female. Subjects ages ranged from 10 to 13 years ($M=11$, $SD=0.66$).

Instruments. Subjects completed selected items taken from the National Centers for Disease Control Middle School Youth Risk Behavior Survey (YRBS), which has a second grade reading level (Brener, Collins, Kann, Warren, & Williams, 1995). The YRBS was designed to assess risk behaviors associated with the leading causes of premature death and disability in the United States. Extensive work has established content validity and reliability of the YRBS. The YRBS items assessed alcohol use and tobacco smoking behaviors. Subjects were asked if they had ever tried

beer, wine, or other alcohol; the age at which they had tried any alcoholic beverage (excluding for religious purposes and drinking with parents); and when, where, and how often they used alcohol. Then, to assess specific drinking patterns, subjects were asked to identify the number of times in the last two months that drinking had made them drunk. The extent of drinking in the past month was determined by the number of days on which they had at least one drink (excluding religious purposes and drinking with parents). Questions about tobacco smoking included whether subjects had smoked tobacco; the age at which they had tried their first cigarette; and whether their fathers, mothers or best friends smoked. All response options were dichotomous. Mother's and father's use of beer and/or alcohol were measured by two three-point (never, sometimes, a lot) scale items. Best friend's alcohol use was measured by a dichotomous item.

After-school physical activity was measured by the Previous Day Physical Activity Recall (PDPAR) (Weston, Petosa, & Pate, 1996). Validity of this instrument was established based on concurrent observation with body motion sensors and heart rate monitors. Test-retest reliability has been reported as 0.98. The PDPAR elicits self-report data on the type and intensity level of physical activity (very light, light, medium, and hard). Thirty-five common activities are listed on the form, and the subject writes in the primary activities performed in 30-minute time blocks from 3 p.m. to 11 p.m. The PDPAR was administered on three consecutive days. A daily PDPAR score was determined by obtaining the number of 30-minute blocks with activity rated at three METS or more (moderate activity). Scores for each day were averaged over three days to obtain an estimate of physical activity.

Procedures. Questionnaires were administered over a 10-week period during spring 1994. Questionnaires were administered to groups of 20 to 25 students in each of the fifth-grade classrooms of the five rural schools. Each student participated in four 30-minute data collection sessions. The YRBS items were administered during the first session, and the PDPAR was administered during the three subsequent sessions. Data were collected by graduate students trained in the study measurement protocol.

Data Analysis. The logistic procedure in the Statistical Analysis Software package (SAS, 1992) was used to examine the predictor variables and alcohol

Table 1. Distribution of Fifth Graders Alcohol Use by Gender and Race (N=367).

Distribution	N	Used Alcohol (n=131)		Did Not Use Alcohol (n=236)	
		n	%	n	%
Gender					
Male	181	84	64	97	41
Female	186	47	36	139	59
Race					
Black	267	95	73	172	73
White	100	36	27	64	27

use. Alcohol use was measured by a dichotomous (yes/no) item that asked whether the student had ever tried alcohol.

Results

Overall, 36 percent ($n=131$) of the fifth graders reported having used or tried alcohol; of these, 64 percent ($n=84$) were boys and 36 percent ($n=47$) were girls. The percentages of black (36%) and white (36%) students who reported use were the same (Table 1). Of students who used alcohol, their frequency of drinking ranged from one or more times per year to more than once per week; almost 30 percent had taken their first drink before age nine. Thirty-four percent had used alcohol at least once in the previous four weeks. Eight percent reported being drunk during the previous two months, and 41 percent ($n=54$) had consumed some alcohol in this period but did not experience intoxication. The most frequently reported place for drinking was at home, and 18 percent reported drinking alone (Table 2). The percentages of students who had tried alcohol and whose mothers (female figure), fathers (male figure), and best friends used alcohol and smoked tobacco are presented in Table 3.

Logistic regression analysis was used to determine the predictors of alcohol use among early adolescents (Table 4). Univariate Mantel-Haenszel crude odds ratios were calculated for demographic variables (age, race, and gender), personal behavior

Table 2. Characteristics of Alcohol Use and Related Behaviors Among Fifth-Grade Students.

Characteristics	n	Percent
Frequency of Alcohol Use (N=367)		
Never used	236	64.3
Tried alcohol	42	11.4
1-2 times per year	72	19.6
1-2 times per month	11	3.0
Every week	4	1.1
More than 1 time per week	2	0.5
Reported Age for First Drink* (n=131)		
Before age 9	37	28.2
Age 9	11	8.4
Age 10	22	16.8
Age 11	12	9.2
Age 12	2	1.5
Age 13	1	0.7
Not reported	46	35.1
Frequency of Drinking During the Last Four Weeks* (n=131)		
None	87	66
1-2 times	39	30
3-5 times	4	3
6-9 times	0	0
10 or more times	1	1
Frequency of Being Drunk During the Last Two Months* (n=131)		
Not at all	66	50.3
Drank, but not drunk	54	41.2
1-2 times	8	6.1
3 or more times	3	2.3
Where Drinking Occurs Among Those Who Drink at Least 1-2 Times per Year (n=89)		
Home	48	54
Friends	13	15
Alone	16	18
Other	12	13

* Excluding drinking with parents and for religious purposes.

Note: Among the total 367 subjects, 131 (36%) reported having used alcohol.

(physical activity and tobacco use), and environmental factors (mother's, father's, and best friend's use of alcohol). The odds of alcohol use among adolescents who smoked were eight times greater than nonsmokers. Smoking was reported by 42 percent of the boys

Table 3. Mother's, Father's, and Friend's Use of Alcohol and Tobacco Among Those Who Had Tried Alcohol (n=131).

	Alcohol		Tobacco	
	n	%	n	%
Mother	48	37	32	24
Father	92	70	59	45
Friend	11	8	9	7

and 49 percent of the girls who had used alcohol. Boys were three times more likely to have used alcohol than girls. Children whose fathers or mothers drank were more likely to use alcohol than children of abstaining parents.

Discussion

The rural environment is clearly not protecting young adolescents from use of alcohol. This study's findings indicate that a significant proportion (36%) of rural fifth graders had tried or had repeatedly used alcohol. Specifically, 64 percent had never tried alcohol, about 11 percent had tried alcohol, and 24 percent had repeatedly used alcohol. Of those who had tried or repeatedly used alcohol, almost one third had done so by age nine. A recent study showed that among rural older adolescents, age at first drink explained 30 percent of the variance in alcohol use (Donnermeyer & Park, 1995). Five percent (n=17) of the fifth-grade subjects reported drinking once a month or more frequently, and 3 percent (n=11) reported drinking until intoxicated. These behaviors are significant risks for future alcohol-related morbidity and mortality.

Reported alcohol use within the last four weeks was less than the 10 percent rate reported for several other rural samples of fifth graders (Grady, Gersick, Snow & Kessen, 1986; Teets, 1991) but similar to the 5.7 percent reported for rural New Hampshire youths (Stevens, Youells, Whaley, & Linsey, 1991). The rate of drinking to intoxication, on one or more occasions during the last two months, also was consistent with

Table 4. Logistic Regression Analyses of Alcohol Use with Demographic and Risk Behaviors of Early Adolescents (N=367).

Predictors	OR	95% CI	CI
Age, years	1.10	0.74	1.63
Gender	2.82	1.66	4.80
Race	0.81	0.46	1.43
Mother drinks alcohol	1.86	1.02	3.38
Father drinks alcohol	2.13	1.22	3.73
Best friend drinks alcohol	1.27	0.34	4.71
Tried smoking tobacco	8.30	4.36	15.78
Moderate physical activity	1.19	0.68	2.08

Note: Model $X^2=99.12$, $df=8$, $P=0.001$.

rates reported in other studies (Harrison & Luxenberg, 1995; Johnston, O'Malley, & Bachman, 1989; Stevens, et al., 1991; Teets, 1991) that found some students to be involved in high-risk behaviors. Clearly, some of the fifth graders in this study were involved in early, regular use, and a few reported heavy drinking that places them at risk for long-term involvement and subsequent health-compromising outcomes.

Of the subjects who had used alcohol (n=131), use primarily occurred at home (54%) with or without parental approval or alone (18%); drinking was least likely to occur with peers (15%). The literature has generally indicated that among comparable rural and slightly older urban samples drinking occurred most often with friends and family. About 40 percent reported drinking with friends and 80 percent reported drinking with family members (Kelleher, Richert, Hardin, Pope, & Farmer, 1992; Millstein, et al., 1992; Stevens, et al., 1991). However, it has been found that older rural adolescents who used alcohol at home with parents or guardians tend to drink less (Donnermeyer & Park, 1995).

The predictors of alcohol use were concomitant tobacco smoking, father's and mother's alcohol use, and male gender. The most significant predictor was concomitant tobacco smoking. This finding supports the view that risk behaviors cluster to form an organized pattern or constellation of interrelated risk behaviors (Jessor, 1987, 1992). Early involvement in alcohol use and sexual intercourse have been shown to be associated with other problem behaviors. Risk behaviors also have been shown to be linked to one

another in a series of stages. The first stage most often includes the use of substances such as tobacco and alcohol, and subsequent stages involve the adding on of higher order behaviors, such as drug use (Elliott & Morse, 1989). It also has been reported that early exposure to situations that foster cigarette use also promotes frequency and heavy drinking at a later time (Bailey & Rachal, 1993; Ellickson & Hays, 1991). If so, a number of fifth graders in this study may be vulnerable to other health-compromising behaviors.

In this study, significantly more boys than girls initiated alcohol use during early adolescence. This is consistent with other researchers who found males to use alcohol at an earlier age than females (Pope, Smith, Wayne, & Kelleher, 1994). They also reported the ratio of male to female problem drinkers among black adolescents to be two times greater than the ratio for white adolescents. Although younger males, both black and white, are more likely than females to report drinking, a comparison study of seventh- and ninth-grade adolescents found no gender or age differences in the predictors of alcohol use (Bloch, Crockett, & Vicary, 1991). These conflicting findings call for researchers to examine gender differences across race, age, and socioeconomic groups.

In this study the proportions of black and white adolescents who had used alcohol were similar (Table 1). However, these findings differ from those of other researchers who report white adolescents to have a significantly higher use rate than black adolescents (Barnes & Welte, 1986; Castiglia, et al., 1989; Millstein, et al., 1992; South Carolina Commission on Alcohol and Drug Abuse, 1993, 1994; Thompson & Wilsnack, 1987). Because this study's sample was 73 percent black, the under-representation of white students may have biased the findings. However, race differences in alcohol use among rural adolescents have not been sufficiently investigated. Limited knowledge in this area restricts the extent to which this study's findings can be compared with those of other researchers.

This study suggests that parental drinking is a risk factor for alcohol use during early adolescence. Modeling has been shown to be the most important way that parents and peers affect others' health-enhancing and health-damaging behaviors (Lau, Quadrel, & Hartman, 1990). Attitudes and actual use patterns of parents and peers have been shown to correlate with adolescent alcohol use, but peer use has been shown to be the most powerful predictor of early adolescent use (Ary, et al., 1993; Dielman, Butchart, & Shope, 1993; McBroom, 1992; Webb &

Baer, 1995). Ellickson and Hays (1991) reported that adult/parental role models were found to be influential in shaping initial alcohol use during seventh grade. This study's finding that either parent's use of alcohol increases the child's use supports the finding that drinking by either parent contributes to alcohol use (Weinberg, Dielman, Mandell, & Shope, 1994). Therefore, continued monitoring of parent and peer influence is necessary to determine if and when peer influence exceeds parental influence.

Conclusions

The salient predictors of alcohol use reported here (tobacco smoking, male gender, and fathers' and mothers' drinking behavior) provide direction for the development of preventive interventions. Because concomitant use of tobacco was the most significant single predictor of alcohol use, health care providers, school health practitioners, and other school personnel should use aggressive programs to prevent tobacco smoking. Clearly, the skills and knowledge to abstain from cigarette smoking and alcohol use should be taught in the early elementary grades.

This study found parental modeling of drinking rather than peer modeling to be associated with alcohol use. The influence of parental behavior on later use and subsequent health problems is not known. The longitudinal design of this study may provide some clarification. Drinking among early adolescents primarily occurred at home, although not necessarily with parental approval. Therefore, environmental variables, such as parental drinking behaviors and the home setting, should be a focus of all prevention programs for this age group. Parents may be unaware of how their own drinking behaviors contribute to their children's experimentation and use of alcohol at an early age. This study's findings also suggest that community and school-based programs should fully involve parents to promote awareness of the important role that parental behavior plays in preventing and delaying alcohol use.

Males, both black and white, living in the rural communities were equally likely to use alcohol at an early age. Because this finding contradicts those of other researchers, it may represent a shift in the behavior of rural black males rather than under-representation of white youths. Longitudinal study is needed to determine the nature and extent of alcohol use among rural black and white youths.

The findings of this study must be interpreted

cautiously. There are many variables that influence the use of alcohol and only a limited number were addressed here. A more complete model of alcohol use in early adolescence would need to include data on multiple risk and protective factors. However, the limitations of this study do not weaken the importance of the findings presented.

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