

# Health Risk Behaviors of Rural Sixth Graders

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**Abstract:** The purposes of this study were to examine the frequency and risk factors (correlates) of single and concurrent health risk behaviors (HRBs) including obesity, physical inactivity, smoking, and alcohol use in a sample of 352 rural, predominately African-American sixth graders. This study was guided by Jessor's (1992) adolescent risk behavior conceptual framework. Data were collected using physical measures and a self-report questionnaire. Thirty-two percent of the sample had no HRB, 44% had one HRB, and 24% had two or more HRBs. Obesity and physical inactivity were more prevalent in this sample than in the general population. Gender differences in risk factors were evident. Our findings suggest the testing of interventions that focus on the social needs of girls and that influence behavioral modeling for boys to reduce single and concurrent health risk behaviors. © 1998 John Wiley & Sons, Inc. Res Nurs Health 21:475-485, 1998

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The top four risk behaviors targeted by Healthy People 2000 (U.S. Department of Health and Human Services [USDHHS], 1995) are physical inactivity, poor nutritional practices, tobacco use, and substance abuse, including alcohol and other substances. These behaviors are major causes of hypertension, heart disease, diabetes, cancer, and accidental death. Although numerous investigators have examined health-related risk behaviors (HRBs) of adolescents, to date research has focused primarily on White and urban adolescents. Therefore, considerably less is known about the risk behavior of rural African-American, as well as rural White, populations. Furthermore, because chronic disease morbidity and mortality are disproportionately high among rural populations, particularly African-Americans (USDHHS, 1994), it is important to investigate health risk behaviors

such as obesity, physical inactivity, smoking, and alcohol use in these populations.

The purposes of this study were to (a) estimate the prevalence of single and concurrent health risk behaviors, including obesity (eating behaviors), physical inactivity, smoking, and alcohol use, and (b) explore the relationships between these behaviors and social-psychological potential risk factors (correlates) and the role of race in a population of rural sixth grade boys and girls.

It is estimated that between 10% and 35% of American adolescents currently are overweight (Alexander & Sherman, 1991; Kuczmariski, Flegal, Campbell, & Johnson, 1994; USDHHS, 1994). Obesity is significantly more prevalent in girls than in boys (Armstrong, Williams, Balding, Gentle, & Kirby, 1991; Stewart et al., 1995) and in African-Americans than in Whites (Sherman,

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Liao, Alexander, Kim, & Kim, 1995). Surveys conducted from 1976 to 1980 and from 1988 to 1991 revealed a 9% increase in the percentage of African-Americans, of both sexes and all ages, and White boys who exceeded the 85th percentile in weight (Troiano, Flegal, Kuczmarski, Campbell, & Johnson, 1995). However, of the four groups—African-American boys and girls, and White boys and girls—African-American boys are least likely to be obese (Gortmaker, Dietz, Sobol, & Wehler, 1987; Must, Gortmaker, & Dietz, 1994).

During the last decade, adolescents have shown a steady decline in physical activity. Furthermore, investigators have found that physical activity decreases significantly with age, specifically during adolescence (Bernard, Lavalley, Gray-Donald, & Delisle, 1995; Heath, Pratt, Warren, & Kann, 1994; Wolf et al., 1993). Participation in vigorous physical activity dropped abruptly from Grade 9 to Grade 12. Of the 81% of boys who were vigorously active in 9th grade, only 70% remained so in 12th grade. Vigorous physical activity among girls dropped from 67% to 45%. Whites were more active than African-Americans, boys were more active than girls, and African-American girls were the least active of the four population groups (Kann et al., 1995).

The increasing prevalence of cigarette smoking among youth has gained national attention. From 1991 to 1994, smoking increased to 18.6% from 14.3% among eighth graders (Johnson, O'Malley, & Bachman, 1995), and increased to 21% in 1996 (American Public Health Association, [APHA], 1997). In South Carolina, regular smoking among high school students increased 14% and 9% for boys and girls, respectively, from 1991 to 1995. Currently, it is estimated that 36% of boys and 29% of girls smoke regularly (Valois, 1996). A study of adolescents living in southeastern metropolitan areas revealed racial differences in smoking behavior. Twenty-four percent of Whites smoked compared with 14% of African-Americans. Moreover, Whites tended to initiate smoking at age 12, about 2 years earlier than African-Americans (Headen, Bauman, Deane, & Koch, 1991).

Studies indicate that youth are experimenting with and using alcohol at earlier ages. The rate of alcohol use is similar in urban and rural areas. Stevens, Youells, Whaley, & Linsey (1991) found that in New Hampshire 56% ( $N = 1,190$ ) of rural students in Grades four through six had tried alcohol, and 5% were regular drinkers. In a Midwest study, Teets (1991) showed that 10% of rural fifth

graders used alcohol on a daily, weekly, or monthly basis, while 2% engaged in heavy drinking. Alcohol use increases with age, and has been reported to be greater among White adolescents than among African-American adolescents, and among boys than girls (Millstein et al., 1992; South Carolina Commission on Alcohol and Drug Abuse, 1993, 1994). Of African-American adolescents, 25% of boys and 13% of girls in Grades 9 through 12 reported the use of alcohol in the previous 30 days compared with 36% and 29% of White boys and girls, respectively (Kann et al., 1995).

Jessor's (1992) conceptual framework for adolescent risk behavior suggests that the identification of demographic, socio-psychological, and environmental risk factors associated with concurrent HRBs could facilitate the design of interventions to simultaneously accommodate multiple risk behaviors (Jessor, 1984). This social-psychological framework consists of three components: explanatory domains, risk behaviors (problem behavior, health-related behavior, and school behavior), and health-compromising outcomes. The domains directly and indirectly influence each other and exert both direct and indirect influence on risk behaviors that determine health/life-compromising outcomes. Each domain contains both risk and protective factors.

The first component of the model contains five explanatory domains, including biological/genetics, social environment, perceived environment, personality, and other behavior. The social environment includes factors that place individuals in the larger social structure and in the context of social interaction and daily life experiences. The social context also includes situations that influence individuals even if they are not directly involved in the activity; for example, media influences (Perry, Kelder, & Komro, 1993). The perceived environment consists of social agents (perceived models) that influence an individual's action. An individual's involvement in risk behavior is contingent on the extent to which an agent is perceived as a model for behavior. Personality, a social-cognitive concept, includes a wide range of personality concepts ranging from religiosity to values on health and fitness (Perry & Jessor, 1985). The domain of "other behavior" focuses on conventional behavior such as working and attending church (Jessor, 1992). In this study, the focus was on selected potential risk factors of the social environment, perceived environment, personality, and other behavior domains and their relationship to having none, one, or two or more HRBs.

The social environment potential risk factors were geographical location of home (town or county), watching television/video, time on the phone, shopping, hanging out, participating in organized sports, and participating in community activities such as 4-H clubs and church groups. The perceived environmental potential risk factors were mother's, father's, and best friend's physical activity level, smoking, and drinking behaviors. The personality factors health, fitness, and enjoyment of physical activity have been proposed as important elements in adolescent health behaviors (Donovan, Jessor, & Costa, 1991; Wankel, 1993). The potential risk factors examined included health status, physical shape, and physical education enjoyment. The domain of "other behavior" included potential risk factors such as not doing homework, household chores, or working at a job.

Thus, the purposes of this study were to estimate the prevalence of single and concurrent behaviors including obesity, physical activity, smoking, and alcohol use. Further, we sought to explore the relationships between these behaviors and potential social-psychological risk factors.

## METHOD

This was a 3-year longitudinal study of physical activity and other health behaviors in early adolescents. The data used in the present study were collected in 1995, during Wave 2 of data collection. Participants were recruited from fifth grade classes in five public schools located in two school districts in rural South Carolina. These students were in sixth grade when Wave 2 data were collected.

### Subjects

A total of 453 students participated in Wave 2 (1995) data collection. Missing information on one or more of the sociodemographic or behavioral variables resulted in the exclusion of 101 (22%) respondents. Therefore, the sample for this study consisted of 352 subjects, including 190 (54%) girls and 162 (46%) boys. Of these, 253 (72%) were African-American and 99 (28%) were White. The sample's mean age was 11.8 years ( $SD = .63$ ). Sixty-five percent were eligible for free lunch. Both male and female groups were similar in age and racial mix. Descriptive statistics indicated that the demographic characteristics of the sample were unchanged by the exclusion of the subjects with missing information.

### Measures of Health-Related Risk Behaviors

**Obesity measures.** Height, body weight, and triceps measurements were used to determine obesity. Height was measured to the nearest 0.5 cm with a portable stadiometer (Perspective Enterprises, Portage, MI). Body weight was measured to the nearest 0.2 kg with a standard balance beam scale (Detecto Scales, Inc. Brooklyn, NY). Mid-upper arm skinfold thickness was measured in millimeters. Three separate measures were obtained using calibrated Lange skinfold calipers. The average of the three measurements was used in the analysis. The inter-rater reliability between examiners and an expert was 100%. Body mass index (BMI) was calculated as body weight in kilograms divided by height in meters squared ( $\text{kg}/\text{m}^2$ ) (Najjar & Rowland, 1987). Students were classified as obese if either their BMI or triceps skinfold thickness (TSF) was equal to or greater than the race-, gender-, and age-specific 85th percentile of the first National Health and Nutrition Survey (NHANES I). The 85th and 95th percentiles of BMI and TSF for individuals over 6 years are used to define obesity and superobesity (Kraemer, Berkowitz, & Hammer, 1990; Must, Dallal, & Dietz, 1991; Najjar & Rowland).

**Physical activity self-report measures.** Physical activity during after-school hours was assessed using the Previous Day Physical Activity Recall (PDPAR). This self-report instrument uses a standardized form organized into seventeen 30-minute blocks of time beginning at 3:00 p.m. and continuing through 11:30 p.m.. Thirty-five common activities are listed on the form and respondents enter the main activity performed during each of the 30-minute time periods. For each block, the respondent rates the intensity of the activity as either very light, light, medium, or hard. The students in this study were provided with verbal and written descriptions, and cartoon illustrations, depicting activity typical of each intensity level. The PDPAR has established validity based on concurrent observation with both motion sensors ( $r = .77$ ) and heart rate monitors ( $r = .63$ ), and established test-retest reliability ( $r = .98$ ) (Weston, Petosa, & Pate, 1997).

The PDPAR was administered in the classroom on three consecutive days by two trained research assistants. The PDPAR measures were averaged to provide an estimate of usual after school physical activity. Data from each day were reduced to the average daily number of 30-minute blocks in which the main activity was rated at three meta-

bolic equivalents (METs) or more — moderate and vigorous physical activity. Subjects with two or fewer 30-minute blocks at the three METs level were classified as inactive. In addition, the PDPAR was used to estimate the amount of time spent talking on the phone, participating in individual and organized sports, working at a job, doing homework, chores, shopping, hanging-out, watching television, and playing video games. MET estimates for activities such as cleaning house, dancing, and doing homework are three METs, five METs, and two METs, respectively.

**Smoking and alcohol use measures.** Cigarette smoking and alcohol use were measured by items selected from the National Center for Disease Control, School Youth Risk Behavior Survey (YRBS) (Kann, 1993). The YRBS was designed to assess adolescent risk behaviors associated with the leading causes of premature death and disability in the U.S. Two YRBS questions were used in this study to measure smoking and alcohol use: (a) During the past month, on how many days did you smoke cigarettes? and (b) During the past month, on how many days did you have at least one drink of alcohol (do not count drinking with your parents or for religious purposes)? Subjects were classified as having smoked or used alcohol if they had smoked or had at least one drink on one or more days during the past month. The definition of alcohol use included infrequent light use and moderate use as described by Ingersol (1989) and Washburn (1991). The validity and reliability of the YRBS have been reported elsewhere (Brener, Collins, Kann, Warren, & Williams, 1995). For this sample, test-retest reliability coefficients for a 1-week interval were .95 for smoking and .81 for alcohol use.

These four measures were used to determine the prevalence and concurrence of the four health risk behaviors (obesity, physical inactivity, cigarette and alcohol use) among the subjects. Subsequently, subjects were classified as either having none, one, or two or more HRBs.

### Measures of Potential Risk Factors

The perceived environment domain included nine dichotomous items addressing mother's, father's, and best friend's physical activity, smoking, and drinking behaviors. Physical activity of mother, father, and best friend was measured by three items developed by the investigators. Their smoking and drinking behaviors were measured by six items selected from instruments by Lowe et al. (1988) and Hansen, Johnson, Flay, Graham, and Sobel (1988). Test-retest reliabilities ranged from

.75 to .98. Two items, father's smoking and father's drinking, were below .80.

The personality domain included three investigator developed dichotomous items addressing perceived health status, perceived physical shape, and enjoyment of physical education. Test-retest reliability coefficients were above .80 except for physical shape, which was .67.

The other behavior domain was comprised of three behaviors, working at job, doing homework, and doing chores. The amount of time spent in these activities was determined by the number of 30-minute time blocks reported on the PDPAR.

### Procedures

All data were collected during school hours. Prior to participation, written informed consent was obtained from each participant and from the primary parent/guardian. The study was approved by the University of South Carolina Institutional Review Board for use on human subjects.

### Data Analysis

Several statistical procedures were used to determine the potential risk factors associated with single and concurrent health risk behaviors of obesity, physical inactivity, smoking, and alcohol use. Chi-square analyses were performed to determine the associations between gender and each of the 22 potential risk factors and the three categories of HRBs (none, one behavior, and two or more behaviors). Of the 22 factors, 12 were significantly associated with the health risk behaviors. These were entered into a comprehensive logistic regression model that simultaneously considered the effects of the 12 factors on having none, one, or two or more health risk behaviors. SAS statistical software (1985) then was used to perform polychotomous logistic regression for categorical analysis and to explore the relationship of race and the 12 potential risk factors with the three categories of HRBs. Subjects with no HRBs constituted the referent group in all analyses. Using backward elimination procedure, all variables retained in the final model were significant at the .05 level.

## RESULTS

Of the 352 subjects, 111 (32%) had no HRBs, 155 (44%) had one HRB, and 86 (24%) had two or more HRBs. Overall, 174 (49%) students were

**Table 1. Distribution of Boys ( $n = 162$ ) and Girls ( $n = 190$ ) by Health Risk Behavior Category and Specific Health Risk Behavior**

HRB Category	Boys		Girls	
	<i>n</i>	%	<i>n</i>	%
None	48	30	63	33
One	70	43	85	45
Obese	54	77	41	48
Inactive	10	14	40	47
Smoke	3	4	3	4
Drink	3	4	1	1
Two or More	44	27	42	22
Inactive/obese	15	34	37	88
Smoke/obese	6	14	1	2
Inactive/drink	6	14	—	—
Drink/obese	9	20	—	—
Inactive/obese/smoke	2	5	2	5
Inactive/obese/drink	2	5	—	—
Obese/smoke/drink	4	9	—	—
Inactive/smoke/drink	—	—	1	2
Inactive/smoke/drink/obese	—	—	1	2

Note: HRB = health risk behaviors.

obese, 116 (33%) were inactive, 23 (7%) smoked, and 27(8%) had used alcohol in the past month. The numbers of health risk behaviors were similar for boys and girls but the pattern of behaviors differed (Table 1). In the one-HRB group ( $n = 155$ ), most of the boys and girls were either obese ( $n = 95$ , 61%) or physically inactive ( $n = 50$ , 32%).

Among subjects in the two-or-more-HRBs category ( $n = 86$ ), the linkage between inactivity and obesity was clear-cut among the girls, with 95% ( $n = 40$ ) of the girls in this category being both obese and inactive. However, only 44% ( $n = 19$ ) of the boys in this category were both obese and inactive.

Far more smoking, alcohol use, or both, were reported among the boys ( $n = 29$ , 67%) than among the girls ( $n = 5$ , 11%).

Because of gender differences observed, separate polychotomous logistic regressions were conducted for girls and boys. Distinctly different multivariate models for girls (Table 2) and boys (Table 3) emerged. The multivariate analysis for girls showed four risk factors to be significantly more common in the one-HRB and two-or-more-HRBs categories than in the referent group (Table 2). Failure to talk on the phone, television/video viewing, nonparticipation in organized sports, and

**Table 2. Risk Factors for One and Two or More Health Risk Behaviors Among Adolescent Girls ( $n = 127$ ) Contrasted With Girls With No Health Risk Behaviors ( $n = 63$ )**

Risk Factors		Number of Health-Related Risk Behaviors	
		One HRB ( $n = 85$ ) OR (95% CI)	Two or More HRB ( $n = 42$ ) OR (95% CI)
Phone Use	(0 = Yes, 1 = No)	3.25 (1.39, 7.61)*	4.29 (1.45, 12.68)*
TV/Games	(0–7.5 Hours)	1.81 (1.14, 2.86)*	2.35 (1.40, 3.96)*
Played organized sports	(0 = Yes, 1 = No)	2.81 (1.20, 6.56)*	17.60 (3.94, 78.6)*
Good physical shape	(0 = Yes, 1 = No)	2.66 (1.18, 5.96)*	11.88 (3.93, 35.5)*
Health is good	(0 = Yes, 1 = No)	4.39 (1.88, 10.3)*	2.38 (0.81, 7.00)
Best friend drinks	(0 = No, 1 = Yes)	0.95 (0.13, 7.13)	8.45 (1.17, 61.2)*

Note: Odds ratios (OR) were calculated using a polychotomous logistic regression analysis. Categories of health risk behaviors (HRB: none, one, two or more) were mutually exclusive. Odds ratios reflect one-unit change in the independent variable.

\* $p < 0.05$ .

**Table 3. Risk Factors for One Health Risk Behavior and Two or More Health Risk Behaviors Among Adolescent Boys ( $n = 114$ ) Contrasted With Boys With No Health Risk Behaviors ( $n = 48$ )**

Risk Factors		Number of Health Risk Behaviors	
		One HRB ( $n = 70$ ) OR (95% CI)	Two or More HRBs ( $n = 44$ ) OR (95% CI)
Played organized sports	(0 = Yes, 1 = No)	1.40 (0.64, 3.08)	8.41 (2.98, 23.72)*
Race	(0 = White, 1 = Black)	3.69 (1.61, 8.26)*	2.09 (0.77, 5.61)
Friend physically active	(0 = Yes, 1 = No)	6.06 (0.58, 62.9)	5.83 (1.09, 10.67)*
Best friend drinks	(0 = No, 1 = Yes)	1.11 (0.43, 4.87)	6.34 (1.40, 28.62)*

Note: Odds ratios (OR) were calculated using a polychotomous logistic regression analysis. Categories of health risk behaviors (HRB); none, one, two or more) were mutually exclusive. Odds ratios reflect one-unit change in the independent variable.

\* $p < 0.05$ .

failure to perceive oneself to be in good shape were associated with both one-HRB and two-HRBs categories. A remarkable increase in the magnitude of the odds ratios (OR) occurred from the one-HRB to the two-HRBs category for non-participation in organized sports and not perceiving self to be in good physical shape. Health status was a significant risk factor for the one-HRB category. Best friend's alcohol use was a risk factor for two or more health risk behaviors. However, race and parents' modeling of physical activity, drinking, and smoking, and friends' modeling of smoking and physical activity behaviors were not related to either one-HRB or two-HRBs categories.

Among boys, simultaneous evaluation of the 12 factors showed race to be the only risk factor associated with one-HRB category. African-American boys were nearly four times more likely than White boys to exhibit one risk behavior (Table 3). The risk factors associated with two HRBs were nonparticipation in organized sports, physically inactive best friend, and use of alcohol by best friend. Watching television and parental modeling of behaviors were not associated with one-HRB or two-HRBs categories.

## DISCUSSION

The present study is unique in investigating the prevalence of concurrent HRBs among rural, predominantly African-American and low income early adolescents, and in simultaneously examining risk factors for both single and multiple HRBs. A major finding was the exceptionally high prevalence of obesity in this sample. The 49% ( $n = 174$ ) rate was considerably higher than the 21% national overall rate for a similar age group (USDHHS,

1995) and the 37% national rate reported for African-American girls (Wolf et al., 1993). Obesity was more prevalent among boys than among girls. Boys far exceeded the reported national rate of obesity (Armstrong et al., 1991; Stewart et al., 1995). The frequency of obesity reported here has clinical significance both for present health status and for adult onset health problems. In the Bogalusa Heart Study (Srinivasan, Bao, Wattigney, & Berenson, 1996), excess weight in adolescence was found to continue into young adulthood in 52% of black men and 62% of black women. Major health problems associated with overweight in young adults include hypertension, diabetes, and other cardiovascular risk factors (Srinivasan et al., 1996).

The alarming rate of obesity observed in this study may be explained by both dietary practices as well as physical inactivity. Dietary practices of rural individuals, particularly African-Americans, include overconsumption of fat and underconsumption of fruits, fiber, and vegetables (Kumanyika, 1990). Other investigators have shown a relationship between weight and activity (Bandini, Schoeller, & Dietz, 1990; Bernard et al., 1995). In the current study, a high rate of inactivity and obesity was found among girls (21%); however, this was not true among boys (12%). For girls, this observation is consistent with prior research.

The rate of drinking in the previous month for this sample ( $n = 27$ , 8%) was comparable to that seen among similar age groups in rural areas (Teets, 1991). More boys than girls drank (15% vs. 2%) and smoked (9% vs. 4%). These findings are consistent with gender differences found in other studies of rural adolescents (Gibbons, Wylie, Echterling, & French, 1986; Kelleher, Rickert, Hardin, Pope, & Farmer, 1992; Pope, Smith, Wayne, & Kelleher, 1994; Sarvela & McClendon, 1988). However, Millstein et al. (1992) reported

drinking prevalence rates of 67% and 63% for boys and girls, respectively, and smoking prevalence rates of 44% and 50% for boys and girls in a sample of sixth grade urban students ( $n = 181$ ). In the present study, the higher rates of drinking and smoking in boys may indicate that more boys than girls transition early into negative adult behaviors. A similar behavior transition in which smoking increased sixfold was reported by Chen and Winder (1986) for boys between sixth and ninth grade. Prevalence of alcohol use and smoking among boys has its origin in long-term exposure. Early use and use of a combination of substances place these adolescents at risk for serious health consequences (Dolcini & Adler, 1994; Kelder, Perry, Klepp, & Lytle, 1994).

Another important finding was the gender difference in risk factors for HRBs. Risk factors for girls with one HRB included factors from the social environment domain (not using the phone, nonparticipation in organized sports, and watching television/video), and the personality domain (not in perceived good shape and health status). Each of these factors, with the exception of health status, the perceived environmental factor, and use of alcohol by best friend, were predictors of two or more HRBs. Thus, the one-HRB and two-HRBs models were differentiated by the factors "health status" and "alcohol use by best friend."

The presence of three social environment factors—not using the phone, nonparticipation in organized sports, and watching television/video—placed these girls at greater risk than girls who talked on the phone, participated in organized sport activities, and did not watch television/video. Thirty-two percent of the girls did not spend time talking on the phone. Although there is limited research on the influence of telephone use on the social connectedness of adolescents in American society, one group of investigators reported that two-thirds of callers to a listening service for adolescents were girls and 96% of calls dealt with peer relationships, family dynamics, and just the need to talk to someone (Boehm, Chessare, Valko, & Sager, 1991). Limited communication networks and lack of communications with friends have been found to be associated with maladaptive and health risk behaviors (Claes, 1992). Our finding suggests that interventions to help adolescents build friendship networks have potential for preventing risk behavior.

Watching television/video was associated with both one HRB and two HRBs, which is consistent with previous research showing television viewing to be associated with health risk behaviors such as obesity (Dietz & Gortmaker, 1993; Shan-

non, Peacock & Brown, 1991) and physical inactivity (Durant, Baranowski, Johnson, & Thompson, 1994; Pate, Heath, Dowda & Trost, 1996). In this study, time spent watching television/video ranged from none up to seven 30-minute blocks of time per day. Girls who viewed television were nearly two times more likely than other girls to have one HRB. An hour increase in viewing time doubled the risk. Television viewing is easily modifiable; the challenge, however, is to assist families to find ways to supplement television viewing with health enhancing activities.

Lack of participation in organized sports also increased the likelihood that girls would engage in HRBs. Forty-three percent of the girls in the study were physically inactive. Not surprisingly, Pate et al. (1996) found that adolescents who participated in school sports had higher physical activity levels. Our findings suggest that a social approach may reduce the likelihood of inactivity among girls. This might include provision of enjoyable and socially oriented sports and game activities to promote healthy lifestyles, and access to affordable resources and opportunities for physical activity (such as jump-rope teams, frisbee teams, hiking trails, dances, and other events) for families and communities. Routinely conducted physical activity counseling during health visits by school nurses and other health providers also might be effective.

Health status was a predictor of one HRB for girls, but did not predict two HRBs. Other research has shown that adolescents often perceive themselves to be less healthy than an adult would rate them (Millstein, 1993). Girls tend to view their health from a holistic perspective that includes physical, emotional, and social dimensions, whereas boys define health in terms of physical concerns (Alexander, 1989). Garcia et al.'s (1995) study of adolescent exercise showed self-appraised health status to influence exercise participation in girls, but not in boys. In the current study, it is unclear why health status was not a predictor of two HRBs among girls.

There are other factors not examined in the present study that may influence adolescent girls to engage in health risk behaviors. Pipher (1992) found that young girls experience a dramatic change in behavior and attitude with entry into puberty, particularly when accompanied by concurrent change in school environment. Moreover, studies have shown that girls gradually lose their prepubescent independence and spirit, and may be vulnerable to a variety of health damaging behaviors (Hancock, 1990). Taylor, Gilligan, and Sullivan (1995) reported similar findings in their 3-

year longitudinal study of minority girls. Changes that girls experience in "self" during adolescence may be reflected in the findings of this study.

For boys, race was the only predictor of one HRB. African-Americans were four times more likely to have one HRB than Whites. Although race is not modifiable, intervening variables may be amenable to intervention. Specifically, because obesity was the most frequently occurring HRB in boys, the risk factors associated with obesity in rural African-American boys should be addressed. Studies of physiological factors, genetics, family history, dietary practices, and socio-demographic factors may identify those factors amenable to prevention or modification.

Three variables, nonparticipation in organized sports, physically inactive best friend, and use of alcohol by best friend, were significant predictors of two or more HRBs among boys, supporting the importance of peer influence in this age group. Our results are consistent with findings that physical activity of peers influence leisure-time activity in boys (Anderssen & Wold, 1992), and peer alcohol use influences drinking or intention to use alcohol, or both (Ary, Tildesley, Hops, & Andrews, 1993; Faulkner & Slattery, 1990).

According to Jessor (1992), there is a strong covariance among drug use, delinquency, alcohol use, and sexual precocity in adolescents, and less strong evidence for covariance among eating, exercise, and safety behaviors. In the present study, the most common HRBs in girls were obesity and physical inactivity. In the boys, combinations of drinking, physical inactivity, poor eating, and smoking were seen. Our findings reflect the kind of behavioral differences between genders that may place boys at greater risk than girls for future drug use, delinquency, and sexual precocity.

Two decades ago, Jessor and Jessor (1977) submitted that adolescents who identified themselves more strongly with peers than parents, especially peers modeling negative behaviors, were more prone to practice health-compromising behaviors. Studies since then have shown that adolescents are more responsive to prosocial or neutral pressures than to high pressure approaches (Berndt, 1979; Brown, Lohr, & McClenahan, 1986) to counter the influence of negative peer behaviors. Therefore, the use and promotion of interventions to increase adolescents' self-confidence and develop their social skills may lessen the magnitude of negative peer influence. Best friend's alcohol use was the only risk factor from the perceived environment to influence HRB among the girls. The age at which other peer behavior will influence rural African-American girls is unknown. For boys, perceived

environment exerted a major influence on two HRBs. Therefore, modeling of positive behavior may be an effective intervention for altering or preventing these risk behaviors.

To further understand adolescent HRBs, the presence of both risk and protective factors needs to be addressed. Jessor's psychosocial (1992) framework contains five conceptual domains, each consisting of risk factors and protective factors. In this study, protective factors such as high intelligence, family life, church attendance, and involvement in school activities were not examined. However, risk exposures of adolescents can be buffered or mediated through protective factors.

The cross-sectional nature of this study precludes drawing conclusions about cause and effect. Because we did not control for the effects of social economic status, our findings are limited to predominantly rural African-American early adolescents of low social economic status. The use of self-report data may limit the validity of the physical activity, smoking, and alcohol use findings. Nevertheless, within these limits, the results provide guidance for the design of a small study to test potential interventions for primary and secondary prevention of obesity, physical inactivity, smoking, and alcohol use in rural sixth graders.

The present study was guided by the Conceptual Framework for Adolescent Risk Behavior (Jessor, 1992). There were gender differences in the HRB correlates for our sample of predominantly African-American, rural sixth-grade children. The important correlates for HRBs for girls were related to the social environment (television watching and lack of participation in organized activities) and perceived environment (alcohol use by best friend). The key correlates for HRBs among the boys were related to the perceived environment (alcohol use by best friend and inactivity of best friend). Further examination of these domains, with the inclusion of both protective and risk factors, is warranted. The findings of this study suggest that domain targeted interventions have potential as a means of preventing and reducing HRB.

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