Prevalence and Correlates of Substance Use Among High School Students in South Africa and the United States

Priscilla Reddy, PhD, Kenneth Resnicow, PhD, Riyadh Omardien, B Bus Sci (Hon), and Nilen Kambaran, AIA

Objectives. We compared prevalence rates and correlates of substance use among high school students in South Africa and the United States.

Methods. We used weighted data from 2 nationally representative surveys of high school students. We conducted bivariate and multivariate analyses and examined between-country differences in rates and correlates of substance use were examined.

Results. Rates of past-month alcohol and marijuana use were lower among South African students than among US students, but rates of illicit hard drug use were higher. Correlates of use in the 2 countries differed. For example, female gender was protective against tobacco, alcohol, and marijuana use in South Africa, whereas in the United States it was protective only against marijuana use. Black race/ethnicity was associated with lower rates of past-month cigarette and alcohol use in both countries, but the protective effect for alcohol use was stronger in South Africa.

Conclusions. Crosscultural studies can elucidate common and culturally unique pathways to drug use. Our results can inform future research, policies, and behavioral interventions in South Africa. (*Am J Public Health.* 2007;97:1859–1864. doi:10.2105/AJPH.2006.086330)

Alcohol and tobacco use and use of other drugs are major sources of morbidity and mortality worldwide,[1,2] and early initiation of these behaviors accelerates their associated risks. In many developing countries, historically lower levels of use have begun to rise, and understanding and preventing problem drug use is a priority.[1] For example, freedom of choice and economic development are increasing in South Africa, but the resulting increase in disposable income may have the unintended consequence of increasing substance use. If rising substance use rates are to be prevented, an understanding of the prevalence and determinants of substance use is essential.

During the 1990s, there were global increases in substance use among adolescents[3–5]; however, most of the data from that period were derived from studies conducted in economically advantaged countries, particularly Australia, the countries of western Europe, and the United States. It may be useful to compare prevalence rates and correlates of substance use in a developed country with a vast research base, such as the United States, with rates and correlates in a developing country, such as South Africa, that is undergoing a major social and economic transition.

In addition, comparisons between South Africa and the United States may be cogent because of the numerous parallels in the social experiences of Black and White residents of the 2 countries.[6] For example, just as the deleterious effects of slavery and social injustice have affected the health status of Blacks in the United States, the social injustice imposed by apartheid may have lingering effects on the health of Blacks in South Africa. Similarly, the process of social liberation itself can lead to added public health challenges, including higher substance use rates, related to increased economic opportunity and disposable income. Finally, given that the US civil liberties experience predates the South African transition, which officially began in 1994, an examination of the US experience may inform drug control policies in South Africa.

Crossnational comparisons are possible when common survey methods and measures are used. In an initiative cosponsored by the US Centers for Disease Control and Prevention and South Africa's National Department of Health, the US Youth Risk Behavior Survey (YRBS) instrument and methodology were implemented in South Africa,[7] providing data for such a comparison. We compared YRBS prevalence rates and correlates of substance use among South African and US high school students in grades 9 through 11.

We had 2 goals. Our first objective was to compare rates of past-month alcohol use, past-month heavy alcohol use, past-month cigarette use, past-month marijuana use, and lifetime illicit drug use among high school students in South Africa to those among high school students in the United States. Our second objective was to compare associations in the 2 countries between substance use and selected sociodemographic factors that have been shown to be related to substance use in the United States and other developed countries (i.e., age, race/ethnicity, gender, grade, and academic performance).

METHODS

Sample and Design

South African data were drawn from the 2002 South African National Youth Risk Behavior Survey (NYRBS),[8] conducted among students in grades 8 through 11. US data were derived from the 2003 YRBS sample, which was made up of students in grades 9 through 12. In our analyses, we included only students in grades 9 through 11. The methodology used in the South African NYRBS, including the survey instrument, was adapted from the YRBS, conducted biennially since 1991.

In both countries, students completed self-administered questionnaires in their classroom under the supervision of trained research assistants. The US study population included both public and private school students, whereas the South African population excluded private school students, who

account for 2.2% of the country's overall student population.[8]

In both countries, a multistage sampling approach was used to achieve nationally representative school and student samples. The YRBS employed a 3-stage cluster sample in which counties, areas within large counties, and groups of smaller counties were the primary sampling units (n=57), followed by schools within selected primary sampling units (n=195) and then 1 or 2 classes within selected schools. Additional details on the YRBS sampling framework can be found elsewhere.[9]

The South African NYRBS employed a 2-stage sample initially stratified according to the country's 9 provinces. The primary sampling units were schools, selected with a probability proportional to student enrollment numbers (207 schools from the 9 provinces). Next, 1 or 2 classes within each participating school were selected systematically with equal probability sampling. All students in the selected classes were eligible to participate. Additional details on the sampling design of the South Africa NYRBS can be found elsewhere.[8]

In South Africa, 10 699 questionnaires were completed in 188 schools, of which 7773 were completed by students in grades 9 through 11 and 2926 by those in grade 8. Of the 207 schools included, none were replaced. The school response rate was 91%, and the student response rate was 73%. The overall response rate was 66%.

In the United States, 15 240 questionnaires were completed in 158 schools, of which 11 254 were completed by students in grades 9 through 11. Thirty-seven schools refused to participate and were not replaced. The school response rate was 81%, and the student response rate was 83%. The overall response rate was 67%. The final pooled data set contained 19 027 students, of whom 52% were female (56% in South Africa and 49% in the United States) and 54% were Black (92% in South Africa and 18% in the United States).

Because the South African NYRBS instrument was developed from the YRBS instrument, the domains and response categories (e.g., levels of use) assessed in the 2 surveys were highly similar. Some modifications, however, were required. In the South African survey, questions were adapted to local language and culture; for example, marijuana was referred to as "dagga," and questions regarding alcohol use included phrases such as a "tot of brandy." In addition, South African students were given the option to complete the questionnaire in 1 of the country's 11 official languages. Questionnaires had been previously translated and back-translated.

Variables Assessed

We examined frequencies of alcohol, tobacco, and marijuana use in the past month, with any consumption classified as past-month use. Heavy alcohol use ("binge drinking") was defined as consumption of 5 or more drinks within a few hours. As a result of the low rates of "hard" drug use, we aggregated lifetime use of cocaine, heroin, injectable drugs, and methamphetamine into a composite variable of lifetime hard drug use.[8]

We classified age as 14 years or younger, 15 years, 16 years, and 17 years or older. As described, the grades we included were 9, 10, and 11. We divided academic performance into 3 categories: "mostly As," "mostly Bs to Ds," and "lower than mostly Ds." The US sample included the race/ethnicity descriptors: Black or African American, White, American Indian or Alaskan Native, Asian, Hispanic or Latino, and Native Hawaiian or Pacific Islander. The South African survey sample included Black, "colored" (i.e., of mixed race), Indian, White, and "other."

To facilitate between-country comparisons, we included in our analysis only students from the United States who designated themselves as Black or African American or White. We included all respondents from the South African sample with the exception of those who described themselves as "other" (1% of the sample); however, consistent with South African demographic conventions, we classified students who identified themselves as "colored" or Indian as Black. For selected analyses, we report rates separately for Black and "colored" South Africans.

Data Analysis

We used SUDAAN version 8.0.2 (Research Triangle Institute, Research Triangle Park, NC) to analyze the merged data set. The sample weights reflected the relative student populations in each country. SUDAAN adjusts for design effects (nonindependence) resulting from sampling within clusters. We calculated the intracluster correlation for each substance use variable using repeated measures analyses of variance on the subset of the merged data composed of grades 9 to 11; these correlations ranged from 0.037 to 0.082, with a mean of 0.054.

We calculated substance use prevalence rates for the entire sample, by country, and according to within-country sociodemographic characteristics. We computed crude odds ratios (and their 95% confidence intervals) to compare relative prevalence rates between the 2 samples, with the US sample serving as the reference group. We performed logistic regression analyses in which each selected dependent variable was regressed onto a set of sociodemographic characteristics to compute adjusted odds ratios. No covariates were entered in this set of analyses. In another set of analyses examining whether the effects of sociodemographic characteristics on substance use behaviors differed between the 2 countries, interaction terms between selected sociodemographic variables and country were entered simultaneously into the model.

RESULTS

Table 1 shows prevalence rates of past-month alcohol use, past-month heavy alcohol use, past-month cigarette use, past-month marijuana use, and lifetime hard drug use for the various sociodemographic subgroups in each country. In the United States, prevalence rates of past-month alcohol use were significantly higher among female students than among male students ($P<.05$); in South Africa, the opposite pattern was observed ($P<.01$).

In South Africa, past-month cigarette use ($P<.01$) and binge drinking ($P<.01$) rates were significantly higher among male students than among female students. These significant differences were driven by the very low rates of substance use among Black female students. In both the United States ($P<.01$) and South Africa ($P<.01$), prevalence rates of past-month marijuana use were significantly higher among male students than among female students. There were no significant gender differences in either country in rates of illicit hard drug use.

TABLE 1—Substance Use Prevalence Rates Among High School Students, by Sociodemographic and Psychosocial Characteristics: United States and South Africa, 2002–2003

	Past-Month Alcohol Use, % (95% CI)		Past-Month Heavy Alcohol Use, % (95% CI)		Past-Month Cigarette Use, % (95% CI)		Past-Month Marijuana Use, % (95% CI)		Lifetime Illicit Drug Use, % (95% CI)	
	United States	South Africa	United States	South Africa	United States	South Africa	United States	South Africa	United States	South Africa
Gender										
Male	40.6 (37.6, 43.5)*	43.4 (39.8, 47.0)**	26.2 (23.7, 28.7)	32.9 (29.8, 25.9)**	20.0 (18.0, 20.9)	30.4 (27.9, 33.0)**	23.9 (21.0, 26.8)**	14.3 (12.3, 16.3)**	12.8 (10.6, 15.1)	19.4 (16.6, 22.1)
Female	43.2 (40.5, 45.8)	27.5 (23.7, 31.3)	25.6 (23.1, 28.0)	18.2 (15.4, 20.9)	21.4 (18.3, 24.6)	15.7 (12.8, 18.5)	18.6 (16.5, 20.8)	5.1 (3.9, 6.3)	11.5 (9.2, 13.7)	17.2 (13.3, 21.0)
Race/ethnicity										
Black	35.8 (32.3, 39.3)**	31.1 (28.2, 34.1)**	14.1 (11.5, 16.8)**	22.8 (20.3, 25.3)**	14.6 (11.7, 17.6)**	20.1 (17.8, 22.3)**	22.7 (19.6, 25.7)	9.1 (7.7, 10.6)	5.9 (3.8, 7.9)**	19.2 (16.1, 22.3)**
White	43.2 (40.5, 47.1)	68.8 (61.0, 76.6)	29.2 (26.7, 31.7)	41.9 (34.5, 49.3)	23.7 (21.2, 26.2)	41.5 (35.2, 47.9)	20.8 (18.1, 23.4)	7.6 (4.5, 10.8)	12.4 (10.1, 14.7)	7.6 (4.3, 10.9)
Age, y										
≤14	31.3 (27.2, 35.3)**	22.3 (15.8, 28.7)**	16.4 (13.3, 19.4)**	14.2 (9.9, 18.5)**	12.8 (9.6, 16.1)**	15.0 (10.0, 19.9)*	13.6 (11.2, 16.0)**	3.7 (1.7, 5.8)**	9.2 (6.8, 11.6)**	13.5 (6.6, 20.4)
15	40.3 (37.3, 43.2)	29.3 (24.5, 34.0)	23.1 (20.2, 26.0)	20.8 (17.4, 24.1)	19.1 (16.5, 21.7)	19.4 (15.5, 23.2)	20.7 (17.4, 24.1)	4.7 (3.2, 6.2)	11.7 (9.1, 14.2)	14.8 (8.5, 21.0)
16	44.7 (41.4, 48.1)	35.1 (29.7, 40.4)	27.8 (25.0, 30.7)	23.2 (19.1, 27.3)	22.1 (19.0, 25.2)	22.5 (18.5, 26.4)	22.2 (19.7, 24.8)	8.7 (6.4, 10.9)	12.4 (10.0, 14.8)	13.4 (9.6, 17.1)
≥17	48.1 (44.3, 52.0)	34.0 (29.2, 38.8)	35.2 (31.8, 38.5)	24.9 (21.2, 28.6)	27.5 (24.5, 30.5)	21.5 (18.0, 25.0)	27.1 (22.9, 31.2)	10.6 (8.6, 12.6)	15.1 (12.7, 17.5)	22.3 (17.5, 27.1)
Grade										
9	36.2 (33.4, 39.0)	31.3 (28.1, 34.5)**	19.8 (17.4, 22.2)**	24.0 (21.6, 26.5)	17.4 (14.9, 19.8)**	22.5 (20.0, 25.0)	18.5 (15.5, 21.4)**	8.6 (6.8, 10.5)	11.1 (8.5, 13.7)	22.5 (18.2, 26.8)**
10	43.5 (40.3, 46.8)	34.1 (27.3, 40.9)	27.5 (24.5, 30.4)	22.3 (17.2, 27.4)	21.8 (18.9, 24.7)	20.2 (15.2, 25.1)	22.0 (19.1, 24.9)	8.7 (6.2, 11.1)	12.7 (10.2, 15.1)	17.4 (12.7, 22.1)
11	47.0 (43.0, 51.1)	39.9 (34.7, 45.1)	31.8 (28.8, 34.9)	29.0 (24.6, 33.3)	23.6 (20.4, 26.8)	24.2 (20.0, 28.3)	24.1 (21.1, 27.2)	10.2 (8.0, 12.4)	13.1 (10.6, 15.5)	11.9 (8.1, 15.8)
Academic performance										
Mostly As	35.5 (32.3, 38.6)**	30.8 (25.7, 35.8)*	20.3 (17.9, 22.6)**	19.1 (15.5, 22.8)**	13.7 (11.9, 15.5)**	18.1 (14.7, 21.5)**	14.2 (12.1, 16.2)**	7.6 (5.6, 9.7)**	8.0 (6.2, 9.8)**	21.9 (16.4, 27.4)*
Mostly Bs–Ds	53.9 (50.1, 57.6)	38.3 (34.0, 42.6)	35.7 (31.7, 39.7)	27.8 (24.4, 31.2)	32.4 (27.9, 36.8)	25.3 (21.8, 28.7)	32.7 (29.2, 36.2)	9.0 (7.4, 10.5)	18.1 (15.2, 21.0)	14.6 (11.8, 17.3)
Lower than	63.9 (52.5, 75.3)	38.7 (34.3, 43.1)	47.7 (35.9, 59.4)	30.7 (27.2, 34.3)	44.5 (34.8, 54.1)	26.4 (22.0, 30.8)	49.8 (39.1, 60.4)	12.8 (10.1, 15.6)	33.0 (21.9, 44.0)	18.0 (14.3, 21.7)
Overall	41.8 (39.2, 44.4)	34.3 (30.9, 37.7)	25.9 (23.6, 28.1)	24.4 (21.8, 27.1)	20.7 (18.4, 23.0)	22.0 (19.5, 24.4)	21.3 (18.9, 23.7)	9.0 (7.7, 10.3)	12.2 (10.1, 14.2)	18.1 (15.3, 20.9)

Note. CI = confidence interval. In South Africa, "Black" comprised students self-identified as Black, "colored," or Indian. In the United States, "Black" comprised students self-identified as Black or African American only.
$^*P<.05$; $^{**}P<.01$ (χ^2 test)

Rates of past-month alcohol use, past-month binge drinking, and past-month cigarette use were significantly higher among White students in both the United States ($P<.01$) and South Africa ($P<.01$) than among Black students. There was no variation according to race/ethnicity in past-month marijuana use. In the United States, the prevalence of lifetime illicit hard drug use was higher among White students ($P<.01$) than among Black students; in South Africa, the prevalence was higher among Black students ($P<.01$) than among White students.

Prevalence rates of past-month alcohol use, binge drinking, marijuana use, and cigarette use varied significantly by age in both the United States ($P<.01$) and South Africa ($\chi^2_3=11.9$, $P<.01$; $\chi^2_3=16.4$, $P<.01$; $\chi^2_3=8.6$, $P<.05$; and $\chi^2_3=42.6$, $P<.01$, respectively). Rates of lifetime illicit hard drug use also varied significantly by age in the United States ($P<.01$), but this variation was not observed in South Africa.

Rates of past-month alcohol use ($P<.01$), binge drinking ($P<.01$), cigarette use ($P<.01$), and marijuana use ($P<.01$) varied significantly among US students by grade, whereas rates varied significantly by grade among South African students for past-month alcohol use ($P<.01$) as well as for hard drug use ($P<.01$). In the United States, there was no grade variation for hard drug use.

Prevalence rates of past-month alcohol use, binge drinking, cigarette use, and marijuana use were significantly higher among students with poorer academic performance in both the United States and South Africa. In the United States, rates of lifetime illicit hard drug use were higher among students with poorer academic performance ($P<.01$) compared with students with better academic performance, whereas in South Africa, rates were higher among students with better academic performance ($P<.05$).

Overall prevalence rates for students in the 2 countries are shown at the bottom of Table 1. Intercountry odds ratios are shown in Table 2. Overall, rates of past-month alcohol and marijuana use were significantly lower among South African students than among US students. By contrast, rates of lifetime illicit hard drug use were significantly

TABLE 2—Odds Ratios of Substance Use Rates Among High School Students in South Africa Relative to Those in the United States: 2002–2003

	OR (95% CI)	*P*
Past-month alcohol use	0.73 (0.60, 0.87)	.001
Past-month heavy alcohol use	0.93 (0.77, 1.11)	.414
Past-month tobacco use	1.08 (0.88, 1.32)	.463
Past-month marijuana use	0.36 (0.29, 0.45)	<.001
Lifetime illicit hard drug use	1.59 (1.21, 2.09)	.001

Note. OR = odds ratio; CI = confidence interval. No covariates were entered in this model.

higher among South African students than among US students. There were no significant differences overall between US students and South African students with respect to past-month binge drinking and cigarette smoking.

Interactions between country and gender ($P<.01$), race/ethnicity ($P<.01$), and academic performance ($P<.01$) were significant for past-month alcohol use (Table 3). The protective effect of female gender was significantly more pronounced in South Africa than in the United States. The protective effects of Black race/ethnicity, although evident in both countries, was significantly greater in South Africa.

Past-month binge drinking exhibited significant interactions between country and gender ($P<.01$) and country and grade ($P<.05$). There was a significant protective effect of female gender in South Africa but not in the United States; by contrast, there was a significant protective effect of being in a lower grade in the United States but not in South Africa.

Interactions between country and gender ($P<.01$), age ($P<.05$), and academic performance ($P<.01$) were significant with respect to rates of past-month cigarette use. There was no significant gender effect in the United States, whereas female gender was significantly protective in South Africa. The protective effects of better academic performance and younger age were significantly more pronounced among US students than among South African students.

Interactions between country and gender ($P<.01$) and between country and academic performance ($P<.01$) were significant for past-month marijuana use. The protective effect of female gender was significantly greater in South Africa than in the United States. The opposite pattern was seen in regard to better academic performance.

Interactions between country and race/ethnicity ($P<.01$), grade ($P<.05$), and academic performance ($P<.01$) were significant with respect to lifetime illicit hard drug use. White race/ethnicity was positively associated with illicit hard drug use in the United States and negatively associated with this variable in South Africa. In South Africa there was a significant protective effect of being in a higher grade, whereas there was no such effect in the US sample. There was a significantly greater protective effect of better academic performance in the United States than in South Africa.

DISCUSSION

Comparison of Prevalence

The South African NYRBS project allowed us to conduct a cross-country analysis of substance use between students residing in a long-established industrialized country and students residing in a country undergoing an economic, social, and cultural transition. Cross-country comparisons indicated differences in rates of use for some of the substances assessed. Rates of monthly marijuana and alcohol use were significantly lower in South Africa than in the United States, whereas rates of lifetime illicit drug use were higher. No differences were observed for heavy drinking or monthly cigarette use. Examination of the individual illicit hard drug categories indicates that heroin use was primarily responsible for the higher rates of use among South African students. An increase in heroin use among South African youths has been reported elsewhere and appears to be

TABLE 3—Odds Ratios Illustrating Interactions Between Country and Selected Substance Use Correlates Among High School Students in the United States Relative to Those in South Africa: 2002–2003

	Past-Month Alcohol Use		Past-Month Heavy Alcohol Use		Past-Month Cigarette Use		Past-Month Marijuana Use		Lifetime Illicit Drug Use	
	OR (95% CI)	Wald χ^2	OR (95% CI)	Wald χ^2	OR (95% CI)	Wald χ^2	OR (95% CI)	Wald χ^2	OR (95% CI)	Wald χ^2
Gender: female vs male	2.35 (1.82, 3.02)	43.9**	2.14 (1.69, 2.72)	39.9**	3.30 (2.47, 4.39)	67.2**	2.52 (1.82, 3.49)	31.0**	0.90 (0.54, 1.52)	0.2
Race/ethnicity: White vs Black	0.32 (0.20, 0.51)	23.7**	1.20 (0.76, 1.88)	0.6	0.88 (0.56, 1.38)	0.3	1.42 (0.77, 2.62)	1.3	7.06 (3.31, 15.03)	25.9**
Age, y: ≤14 vs 15	0.80 (0.48, 1.32)	2.3	0.92 (0.59,1.43)	1.7	0.69 (0.38, 1.25)	9.8*	0.80 (0.37, 1.75)	5.8	0.77 (0.30, 1.98)	1.0
Age, y: ≤14 vs 16	0.97 (0.54, 1.75)		0.93 (0.54, 1.58)		0.60 (0.34, 1.07)		1.52 (0.72, 3.21)		0.90 (0.40, 2.04)	
Age, y: ≤14 vs 17	0.91 (0.50, 1.66)		0.75 (0.44, 1.30)		0.39 (0.19, 0.77)		1.26 (0.63, 2.52)		1.07 (0.43, 2.67)	
Grade: 9 vs 10	0.71 (0.46, 1.08)	2.73	0.56 (0.38, 0.83)	8.9*	0.71 (0.44, 1.14)	4.3	0.74 (0.43, 1.28)	1.2	0.61 (0.33, 1.16)	6.6*
Grade: 9 vs 11	0.83 (0.56, 1.21)		0.69 (0.47, 1.04)		1.13 (0.67, 1.92)		0.81 (0.46, 1.44)		0.40 (0.20, 0.81)	
Academic performance: As vs Bs–Ds	0.55 (0.38, 0.80)	10.6**	0.67 (0.46, 0.97)	4.9	0.43 (0.30, 0.62)	23.6**	0.40 (0.28, 0.58)	24.7**	0.23 (0.14, 0.39)	32.1**
Academic performance: As vs Es–Fs	0.45 (0.21, 0.95)		0.59 (0.28, 1.21)		0.25 (0.12, 0.53)		0.35 (0.16, 0.79)		0.13 (0.05, 0.33)	

Note. OR = odds ratio; CI = confidence interval. The model included all sociodemographic variables, their main effects, and their interactions with country. In South Africa, "Black" comprised students self-identified as Black, "colored," or Indian. In the United States, "Black" comprised students self-identified as Black or African American only.
*$P<.05$; **$P<.01$ (χ^2 test)

related to an increase in supply as well as a drop in price.[10,11]

The relatively lower rates of marijuana use we found among South African students were consistent with data from other developing countries,[4,12] and the higher rates among US students were consistent with data from other North American and western European countries.[5,12] In a 2002 World Health Organization study of marijuana use in 31 nations, the United States ranked third in use behind Canada and Switzerland[12]; South Africa was not included in that study. Thus, it appears that US rates are relatively higher than average and that South African rates are relatively lower.

In South Africa, the legal age limits for alcohol and tobacco use are 18 years and 16 years, respectively, whereas the corresponding ages in the United States are 21 and 18 years (or older in some cases). Our results showed that, despite these differences, monthly use of alcohol and tobacco was not appreciably higher in South Africa than in the United States. However, we were unable to discern how legal age limits may have affected substance use behaviors among students in the 2 countries.

Comparison of Correlates

Substance use correlates also differed between the 2 countries. For example, although Black race/ethnicity was associated with lower rates of cigarette and alcohol use in both countries, the protective effect on alcohol use was significantly more pronounced for South African students. Similarly, rates of tobacco, alcohol, and marijuana use were significantly lower among female South African students than among their male counterparts, whereas in the United States female gender was protective only in the case of marijuana use (and even then the effect was not as pronounced as in South Africa). After removal of "colored" female students from the South African sample, the rate of monthly cigarette use among the remaining Black girls was only 10% (as opposed to 13% with "colored" female students included).

The stronger protective effects of Black race/ethnicity and female gender in South Africa than in the United States may reflect the unequal rights that had been afforded to Black and female citizens under the apartheid years. As recent egalitarian racial and gender policies become more firmly established, the "protective" effects of race and gender may weaken in South Africa.

One factor that may suppress use of tobacco and other drug use among Black girls in South Africa is that substance use among girls is highly stigmatized in the traditional N'guni culture. Girls who smoke cigarettes are perceived as "lacking in virtue" and as an embarrassment to their families.[13] If the influence of traditional African culture diminishes with the integration of South Africa, the suppressing effect of culture may weaken, and a rise in smoking among female Black Africans may occur.

In addition, the lower smoking rates observed among South African students may have been related to a lack of disposable income. Internationally, higher consumer expenditure rates are associated with higher rates of marijuana use.[12] Economic disparities between Blacks and Whites are even greater in South Africa than in the United States. South Africa's Gini coefficient is 0.58, ranking it as a country with the one of the most unequal distributions of wealth.[13,14] It is quite possible that the increasing economic opportunities available to South African Blacks will result in a dramatic increase in their smoking. In fact, in our sample, rates of tobacco, marijuana, and alcohol use were considerably higher among Black students who reported that they had more than 20 rand in spending money each month (approximately US $3.25) than among their South African counterparts reporting less available spending money (data not shown).

Interestingly, smoking rates among "colored" South Africans are as high as or higher than those among White South Africans.[8] This too may portend an increase among Black South Africans in that, under apartheid, "colored" South Africans were considered to be of higher status than were Blacks. Finally, smoking prevalence rates have historically been considerably lower among Black youths than among White youths in the United States. Over the past 15 years, however, the gap has begun to narrow,[15] and the possibility exists for a similar narrowing of the Black–White gap in South Africa. However, because Blacks are a majority in South Africa but a minority in the United States, smoking trends among South African youths may follow a different trajectory than that of their US counterparts.

Better academic performance and younger age were protective against most drug use behaviors in both countries. However, academic performance, age, and grade were all significantly less protective in South Africa. Social groups in South Africa may be less formed around these characteristics than are social groups in the United States, and classrooms in South Africa may be more heterogeneous with regard to such factors. For example, in South Africa, 29% of ninth graders in this study were aged 17 years or older compared with just 1% of ninth graders in the United States.

In both countries, drug use rates were higher among the older students in the ninth grade than among their younger counterparts (data not shown). Therefore, the higher proportion of older students in lower grades in South Africa could have attenuated the effects of grade on substance use. The commingling of older children in younger grades may reduce the impact of age on substance use. One implication is that substance use prevention programs may need to begin at earlier grades in South Africa. Also, the weaker association of academic performance with substance use in South Africa merits further investigation.

Limitations

Our study involved several limitations. First, our results were based on self-reports. In addition, our findings may have been influenced by different levels of questionnaire reliability and validity in the 2 countries (i.e., differential bias). However, in the design and administration of the surveys in both the United States and South Africa, various steps were taken to mitigate such bias, for example students were allowed to participate anonymously and voluntarily while not in the presence of teachers.[8,10] Nevertheless, because we were unable to empirically address this issue, we cannot dismiss differential bias as a potential confounder for the results observed.

Second, substance use rates among students who were habitually absent may have been different than rates among their counterparts

who attended school regularly. Thus, the external validity of our results may be limited to students who were not absent on the day of administration. However, although the prevalence rates reported here may be underestimates, the comparisons with the US sample remain valid given that the same external validity issues affected the US sample. In addition, because private schools were not included in the sampling frame, our findings may not be generalizable to students attending these schools.

Finally, the common correlates assessed in the 2 studies were generally limited to sociodemographic variables. Key psychosocial variables known to affect substance use such as perceived norms, outcome expectancies, ability to resist peer appeals, depression, and stress were not included. Future crossnational studies would benefit from the inclusion of a broader range of risk and protective factors.

Conclusions

Our findings raise potentially important questions about the trajectory of alcohol, tobacco, and other drug use in South Africa and the associated determinants and correlates of use. Future research, policy, and behavioral interventions should take into account the sociodemographic and psychosocial contexts of substance use among South African youths. ■

About the Authors

Priscilla Reddy is with the Medical Research Council, Cape Town, South Africa. Kenneth Resnicow is with the Department of Health Behavior and Health Education, University of Michigan, Ann Arbor. Riyadh Omardien and Nilen Kambaran are with ARCH Actuarial Consulting, Cape Town.

Requests for reprints should be sent to Nilen Kambaran, ARCH Actuarial Consulting, PO Box 12573, Mill St, 8010, Cape Town, South Africa (e-mail: nilen@archac.com).

This article was accepted July 15, 2006.

Contributors

P. Reddy originated the study. K. Resnicow guided the analyses and led the writing of the findings. R. Omardien and N. Kambaran completed the analyses.

Acknowledgments

The US survey was conducted by the Centers for Disease Control and Prevention (CDC). The South African survey was conducted by the Medical Research Council of South Africa, assisted by the CDC. Funding was provided by the South African National Department of Health and the US National Institutes of Health (grant TW005977).

We express our gratitude to the research and administration teams and the high school students who participated in the 2 surveys.

Human Participation Information

The South African Youth Risk Behavior Survey was approved by the South African Medical Association. The US Youth Risk Behavior Survey was approved by the Centers for Disease Control and Prevention. In South Africa, parents and students provided informed consent. In the United States, parents provided informed consent.

References

1. *The World Health Report 2002: Reducing Risks, Promoting Healthy Life.* Geneva, Switzerland: World Health Organization; 2002.

2. Peto R, Lopez AD, Boreham J, Thun M, Heath C Jr. *Mortality From Smoking in Developed Countries.* Oxford, England: Oxford University Press Inc; 1994.

3. Bauman A, Phongsavan P. Epidemiology of substance use in adolescence: prevalence, trends and policy implications. *Drug Alcohol Depend.* 1999;55: 187–207.

4. Merrril JC, Kleber HD, Shwartz M, Lui H, Lewis SR. Cigarettes, alcohol, marijuana, other risk behaviors, and American youth. *Drug Alcohol Depend.* 1999;56: 205–212.

5. Po-Hsiu K, Hao-Jan Y, Wei-Tsuen S, Wei JC. Substance use among adolescents in Taiwan: associated personality traits, incompetence, and behavioural/ emotional problems. *Drug Alcohol Depend.* 2002;67: 27–39.

6. Mbeki T. Address presented at the University of the West Indies, Kingston, Jamaica, June 30, 2003. Available at: http://www.anc.org.za/ancdocs/history/ mbeki/2003/tm0701.html. Accessed June 28, 2007.

7. Pirkis JE, Irwin CE, Brindis C, Patton GC, Sawyer G. Adolescent substance use: beware of international comparisons. *J Adolesc Health.* 2003;33:279–286.

8. Reddy SP, Panday S, Swart D, et al. *Umthenthe Uhlaba Usamila—The South African Youth Risk Behaviour Survey 2002.* Cape Town, South Africa: South African Medical Research Council; 2003.

9. Centers for Disease Control and Prevention. Youth risk behavior surveillance—United States, 2003. *MMWR Morb Mortal Wkly Rep.* 2004;53(SS-2):1–96.

10. Parry CDH, Pluddemann A, Myers BJ. Heroin treatment demand in South Africa: trends from two large metropolitan sites (January 1997–December 2003). *Drug Alcohol Rev.* 2005;24:419–423.

11. Pluddemann A, Parry CDH. The nature and extent of heroin use in Cape Town: a qualitative study. *Afr J Drug Alcohol Stud.* 2004;3:31–51.

12. Bogt T, Schmid H, Gabhainn SN, Fotiou A, Vollebergh W. Economic and cultural correlates of cannabis use among mid-adolescents in 31 countries. *Addiction.* 2006;101:241–251.

13. Marks AS, Steyn K, Ratheb E. *Tobacco Use by Black Women in Cape Town.* Cape Town, South Africa: Medical Research Council of South Africa; 2001. MRC policy brief 3.

14. *Human Development Report 2005.* New York, NY: United Nations; 2005.

15. Monitoring the Future Online Data Analysis System, Substance Use and Mental Health Data Archive. Available at: http://www.icpsr.umich.edu/SAMHDA/ das.html. Accessed April 19, 2006.

Race and Research

Perspectives on Minority Participation in Health Studies

Edited by Bettina Beech, DrPH, MPH, and Maurine Goodman, MA, MPH

This book is a teaching text and resource guide for students, health professionals, public health researchers, and the general public that extends the discussion of environmental factors that influence ethnic minority participation in health studies. This book examines the lack of minority participation in health studies from social, historical, and scientific perspectives.

This book is divided into three main sections: 1) The Meaning of Race, Culture and Ethnicity in Research; 2) Health Studies and Ethnic Minority Populations and 3) The Impact of Revolutionary Changes in Medicine and Health Care on Minority Participation in Health Studies.

ORDER TODAY!

ISBN 0-87553-030-3
212 pages, softcover, 2004
$25.00 APHA Members (plus s&h)
$39.95 Nonmembers (plus s&h)

American Public Health Association
PUBLICATION SALES
WEB: www.apha.org
E-MAIL: APHA@pbd.com
TEL: 888-320-APHA **FAX:** 888-361-APHA