Epidemiology of Alcohol and Other Drug Use among American College Students*

PATRICK M. O'MALLEY, PH.D., AND LLOYD D. JOHNSTON, PH.D.

Institute for Social Research, Survey Research Center, Room 2320, University of Michigan, P.O. Box 1248, Ann Arbor, Michigan 48106-1248

ABSTRACT. *Objective:* This article provides information on the extent of alcohol use and other drug use among American college students. *Method:* Five different sources of data are examined for estimating recent levels of alcohol (and other drug) use among college students: Harvard School of Public Health College Alcohol Study (CAS), the Core Institute (CORE), Monitoring the Future (MTF), National College Health Risk Behavior Survey (NCHRBS) and National Household Survey on Drug Abuse (NHSDA). *Results:* Alcohol use rates are very high among college students. Approximately two of five American college students were heavy drinkers, defined as having had five or more drinks in a row in the past 2 weeks. Alcohol use is higher among male than female students. White students are highest in heavy drinking, black students are lowest and Hispanic students are intermediate. Use of alcohol—but not cigarettes, marijuana and cocaine—is higher among college students than among noncollege age-mates. Longitudinal data show that, while in high school, students who go on to attend college have lower rates of heavy drinking than do those who will not attend college. Both groups increase their heavy drinking after high school graduation, but the college students increase distinctly more and actually surpass their nonstudent age-mates. Trend data from 1980 to 1999 show some slight improvement in recent years. *Conclusions:* Despite improvements in the past 20 years, colleges need to do more to reduce heavy alcohol use among students. (*J. Stud. Alcohol,* Supplement No. 14: 23-39, 2002)

THIS ARTICLE summarizes what is known from large-scale survey studies about prevalence and trends in alcohol and other drug use among American college students in recent years. The major focus is on alcohol use among full-time students attending 2- and 4-year colleges in the United States. For purposes of simplification, part-time students are excluded. Many part-time students have jobs, families and other activities that make the experience of being a student quite different than that of the full-time student whose primary identification is "student." It is likely that alcohol use would function very differently for full-time versus part-time students. In addition, full-time students attending a 4-year college represent a rather different population than students attending 2-year institutions.

An important early source of information on college student drinking is the classic *Drinking in College* by Straus and Bacon (1953). There were few studies following that classic, however, that permit an assessment of the state of drinking among college students after that report. Blane and Hewitt (1977) conducted a comprehensive review of the literature between 1960 and 1975 relating to alcohol use and misuse among young people, including college students. They found that "analysis of 68 surveys of drinking among college students reveals a slowly increasing rate of prevalence of drinking since World War II which continues to the present [circa 1975]….although some evidence suggests high problem drinking rates among noncollege young people, no comparable data [on problem drinking rates] from college students are available" (p. IV-22).

The situation with respect to available data has improved considerably since the report by Blane and Hewitt (1977). There are a number of sources of relatively recent data on alcohol use among college students, beginning around 1980. In the present article, we present some of those data. The emphasis is on "current" use by students, rather than long-term use, because our interest is primarily in use within the college environment, not in use that may have occurred in prior environments.

Method

Five different data sources, all national in scope, are examined for estimating recent levels of alcohol (and other drug) use among college students in the United States. The five sources differ with respect to population coverage, data collection methodology, instrumentation, period of data collection and other factors, as will be described below. Although there are numerous other potential sources of information, they generally are not national in scope. Each of these five sources of information provides some unique data. Table 1 compares the five, and a brief description of each follows.

TABLE 1.   Comparison of five data sources

	CAS	CORE	MTF	NCHRBS	NHSDA
Undergraduates	✔	✔	✔	✔	✔
Graduates	–	✔	–	–	–
Full-time	✔	✔	✔	✔	✔
Part-time	–	✔	–[a]	✔	✔
Probability sample	✔	–	✔	✔	✔
Institution-specific	✔	✔	–	✔	–
Noncollege group	–	–	✔	–	✔
Repeated series	✔	✔	✔	–	✔
Longitudinal panel	–	–	✔	–	–
2-year institution	–	✔	✔	✔	✔
4-year institution	✔	✔	✔	✔	✔

Notes: ✔ Included in relevant study; (–) not included; [a]available, but not routinely reported.

College Alcohol Study (CAS), Harvard School of Public Health

Henry Wechsler is principal investigator of this study (Wechsler et al., 1994, 2000; http://www.hsph.harvard.edu/cas), which is funded by the Robert Wood Johnson Foundation. A major feature of this study is that there were three national surveys of college students, thus providing data for three time points—1993, 1997 and 1999—in the same sample of colleges (obviously not the same students). In 1993 the study began with a national sample of 195 4-year colleges, and then selected a random sample of students within the 140 colleges that agreed to participate. A total of 15,103 students completed a 20-page, mail-out, self-administered questionnaire; the student response rate was 69%. In 1997, 130 of the colleges were resurveyed, and 116 of them provided usable data from 14,521 students; the student response rate was 60%. In 1999, 128 of the original 140 colleges participated, providing usable data from 14,138 students; the student response rate was 60%.

An additional survey was conducted in 2001, but results have not yet been reported. The survey is quite comprehensive in its measures of alcohol use. It also includes measures of other drug use and tobacco, and various health topics, including unsafe sex, rape and involuntary sex.

The major advantages of this series are:

- There are large samples; thus subgroups can be studied.
- There is information about institutions, and respondents are grouped by institution; institution-level variables and policies can be analyzed.
- The study has a major focus on alcohol use and misuse among college students, and there is considerable instrumentation devoted to alcohol use and related attitudes, beliefs and behaviors.
- There are repeated surveys; thus change over time can be studied.

The Core Institute (CORE), Southern Illinois University

Cheryl Presley is the principal investigator of this study (Presley et al., 1996; http://www.siu.edu/~coreinst/), which

has been funded by the Drug Prevention in Higher Education Program of the Fund for the Improvement of Postsecondary Education (FIPSE), U.S. Department of Education. The Core Alcohol and Drug Use Survey is specifically designed for use with college students. Institutions participate on a voluntary basis, so the self-selected sample is not nationally representative. (Some but not all of the institutions that use the survey are FIPSE-funded.) Most of the institutions strive to obtain student samples representative of the institution. More than 45,000 students participated in the study's fourth cycle, 1992-94. Previous cycles were in 1989-91, 1990-92 and 1991-93. The survey instrument measures use of alcohol and other drugs.

The major advantages of this series are:

- There are large samples; thus subgroups can be studied.
- There is information about institutions, and respondents are grouped by institution; thus institution-level variables and policies can be analyzed.
- There are questions about the use of alcohol and other drugs, and particularly with "the long form" there are questions about other alcohol-related attitudes, beliefs and behaviors.

Monitoring the Future (MTF), University of Michigan

Lloyd Johnston is principal investigator of this study (Johnston et al., 2000; http://www.monitoringthefuture.org), which is funded by a series of R01 grants from the National Institute on Drug Abuse. Since 1976, the study has conducted annual nationwide surveys of about 17,000 high school seniors. Since 1977, it has conducted an annual mail follow-up survey of representative subsamples from all previously participating senior classes. Thus since 1980 it has annually surveyed members of the four previous classes; these surveys include many respondents who are currently full-time college students (about 1,500 students per year). Follow-up response rates have averaged about 70% in recent years. The study contains various measures of alcohol use, as well as extensive measurement of other drugs and tobacco.

The major advantages of this series are:

- Long-term trend data are available (since 1980).
- The study is ongoing.
- The design is longitudinal, including data on students prior to high school graduation; thus one can examine changes in substance use that occur in college (as well as after college).
- The design includes both college students and their same-age peers not attending college, allowing comparisons between these groups.
- There is considerable instrumentation about substance use and related factors.

The students are not clustered by college, and there is very limited information obtained about the institution.

National College Health Risk Behavior Survey (NCHRBS), Centers for Disease Control and Prevention

This one-time study (Centers for Disease Control and Prevention, 1997; http://www.cdc.gov/epo/mmwr/preview/mmwrhtml/00049859.htm; data: http://www.cdc.gov/nccdphp/dash/yrbs/datareq.htm), part of the ongoing Youth Risk Behavior Surveillance System, was conducted in January to June of 1995 by the Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion. It used a nationally representative sample of undergraduate college students age 18 years or older, clustered in 2- and 4-year colleges and universities. Of 148 institutions selected (74 2-year and 74 4-year; stratified on the basis of relative proportion of black and Hispanic students), 136 participated. The target sample of students was 56 from each 4-year institution and 72 in each 2-year institution. A total of 4,838 students completed mail questionnaires, yielding a response rate of 65%. The study includes measures of alcohol use, as well as other drugs and tobacco, and a number of other health-risk behaviors, including sexual behaviors, dietary behaviors and physical activity.

The major advantages of this series are:

- Data are available on several health-risk behaviors, including alcohol and drug use.
- The design allows some ethnic group comparisons.

There is no information about the institution available on the public use data files.

National Household Survey on Drug Abuse (NHSDA), Substance Abuse and Mental Health Services Administration

The surveys in this series (Gfroerer et al., 1997; http://www.samhsa.gov/), which uses in-home interview procedures, are done under government contract. Currently, the contractor is the Research Triangle Institute. Prior to 1991, the survey was conducted every 2 to 3 years, and individuals living in group quarters (e.g., college dormitories) were not included in the sample. Since 1991, the survey has been conducted every year, and the respondent universe has been the civilian, noninstitutionalized population ages 12 or older within the United States, including residents of noninstitution group quarters (e.g., shelters, rooming houses, college dormitories) as well as residents of civilian housing on military bases.

Reports from the series normally do not distinguish college students from other individuals. However, there has been one report that focused on substance use in the college-age population wherein students were distinguished from nonstudents (Gfroerer et al., 1997). For this report, the authors used data from the 1991 to 1993 NHSDA com-

bined. The college-age population was defined as persons ages 17-22 who were not enrolled in high school and had not completed 4 years of college. There were a total of 11,982 respondents who met those criteria; 4,848 were defined as college students and 7,134 as not college students. Because both part-time and full-time students were identified, the definition of *college student* presumably includes both groups.

The study includes questions about alcohol use as well as tobacco and illicit drugs. Beginning in 1999, the annual sample size was increased substantially, possibly allowing for better estimation of college students' behaviors on an annual basis.

The major advantages of this series are:

- Trend data are potentially available, beginning in 1991-93.
- The study is ongoing.
- The design includes both college students and their same-age peers not attending college (including high school dropouts).
- A broad range of substance-using behaviors is included.
- The samples are likely to be fairly large from 1999 on.

The students are not clustered by college, and there is no information obtained about the characteristics of the institution.

Results

Current use estimates

Figure 1 shows estimates of alcohol use from the five sources of data. The most recent data come from the MTF and the CAS studies. In spring of 1999, 30-day prevalence among full-time college students ages 19-22 (i.e., 1-4 years post high school) was 69.6% (MTF data). In other words, fully two of every three college students had had an alcoholic drink in the 30 days prior to the survey. Conversely, almost one third had not had even a single drink in the prior 30 days.

More problematic use is defined in this study as drinking five or more drinks in a row, sometimes described as "binge drinking" (Wechsler and Austin, 1998), and here described as "heavy drinking." Figure 1 shows that 40% of college students in the 1999 MTF study report having engaged in heavy drinking at least once in the past 2 weeks. This means that more than half of those who drank at all in the past 30 days (70%) had been drinking heavily on at least one occasion in the past 2 weeks.

All the sources in Figure 1 confirm the extraordinarily high prevalence of heavy drinking. The MTF, CAS, NCHRBS and CORE studies have all found that "approximately 2 of 5 American college students can be termed binge drinkers" (Wechsler and Austin, 1998, p. 57). CAS found prevalence of heavy drinking to be at 44% in 1993 and 43% in 1997. In this study, heavy drinking was defined
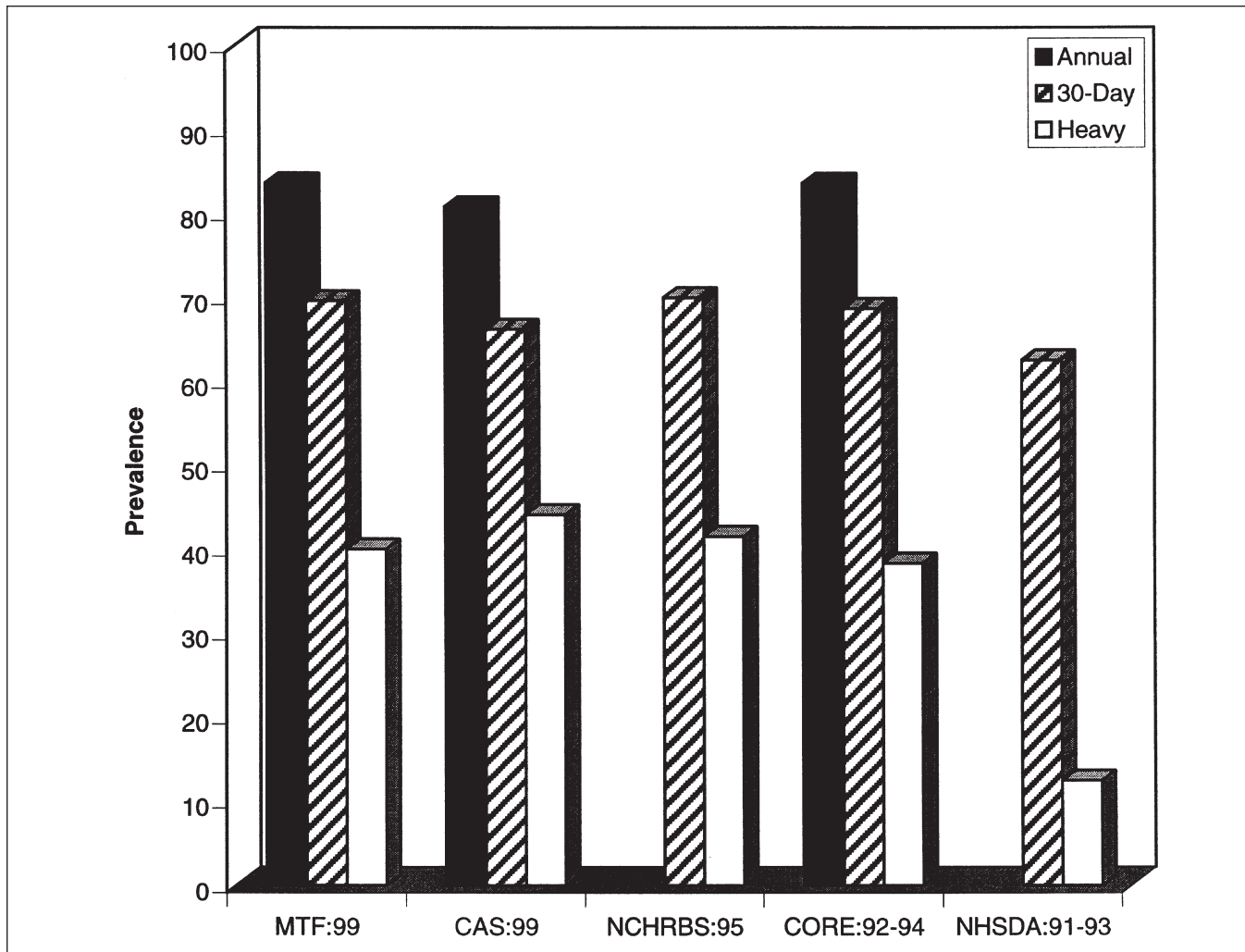
FIGURE 1.   Prevalence of annual, 30-day and heavy alcohol use among college students (MTF, CAS, NCHRBS, CORE, NHSDA)

as having at least five drinks in a row for men or four drinks in a row for women during the prior 2 weeks. NCHRBS reported that 42% of college students ages 18-24 in 1995 had drunk five or more drinks on at least one occasion in the prior 30 days. (Note that this study used a reporting period of 30 days instead of the 2 weeks used in other studies.) CORE reported in its 1992-94 survey that 38% of students had at least one heavy-drinking episode (five or more drinks in one sitting) in the prior 2 weeks (Presley et al., 1996, p. 15). NHSDA did not report a comparable measure; they reported only a measure of very heavy drinking (i.e., five or more drinks per occasion on each of 5 or more days in the prior 30 days). Even with this measure of more extreme drinking, 12% of college students in 1991-93 reported very heavy drinking.

It is noteworthy that the various estimates are generally consistent with one another. This consistency suggests that there is considerable validity to the conclusion that drink-

ing rates are indeed quite high among college students, which, of course, comes as no surprise. To be sure, there are some differences as well. For example, the 1995 NCHRBS found 42% reporting heavy drinking in the past 30 days, whereas the 1997 CAS reported 43% heavy drinking in just the past 2 weeks. The shorter time interval in the CAS should have produced a lower estimate than the NCHRBS, but some of the difference is due to the fact that the CAS used a gender-specific criterion, which raised the estimate. The 1995 MTF study reported a rate of 39% heavy drinking in the past 2 weeks, which is fairly consistent with the slightly higher rates reported in the NCHRBS.

Trends in use

Only the MTF study has reported comparable trend data over more than 4 years, using national probability samples and consistent methods of sampling and measurement
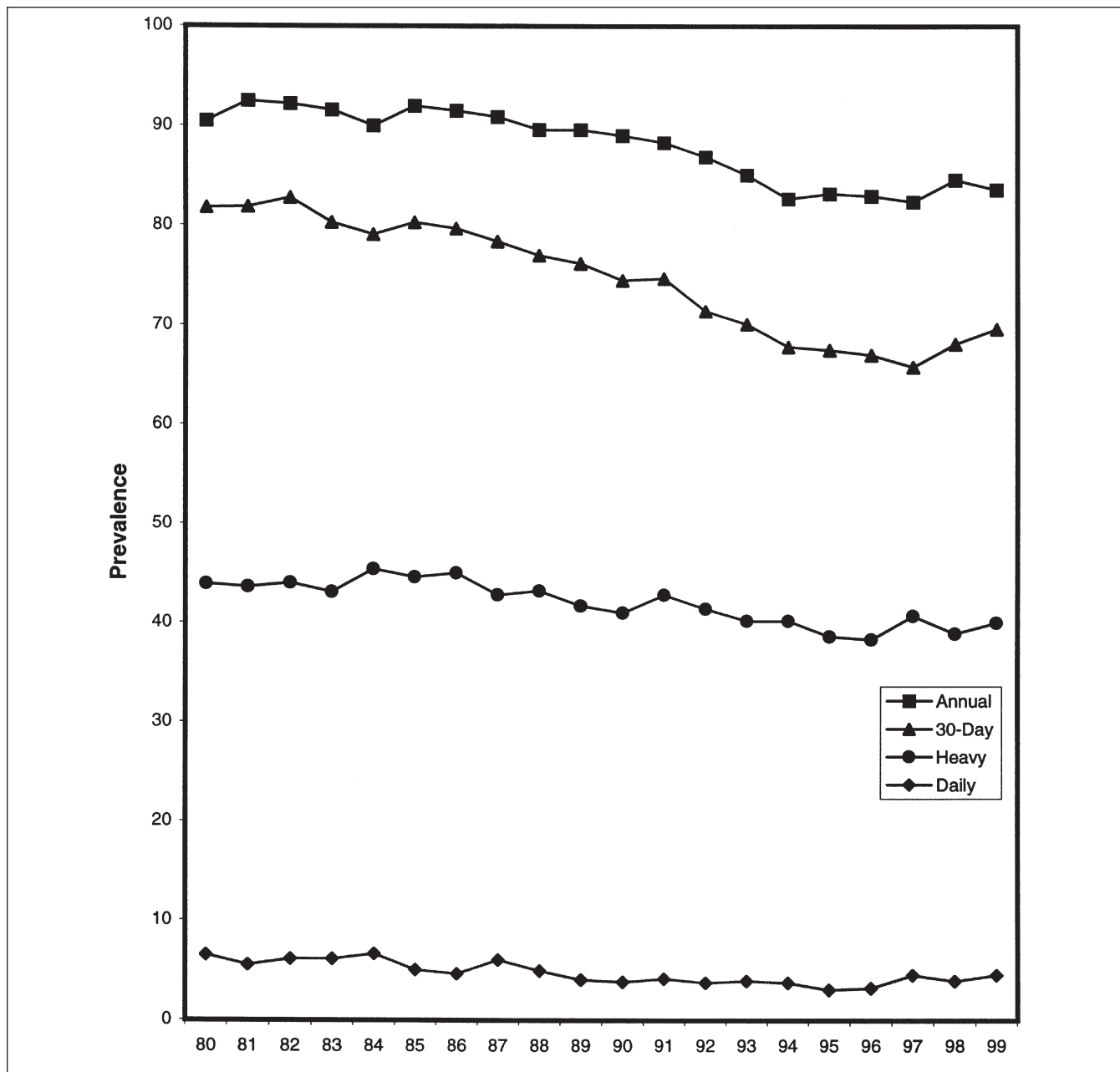
FIGURE 2.   Trends in annual, 30-day, heavy and daily alcohol use among college students, 1980-99 (MTF)

(Johnston et al., 2000). Figure 2 provides trends since 1980 for college students. The trend lines show some slight improvement in recent years: 30-day prevalence of alcohol use peaked at 83% in 1982; that figure was down to 70% in the most recent year (1999), a 16% decline. However, the more important measure of heavy drinking showed a slightly smaller decline from a peak 45% in 1984 to 40% in 1999, a decline of 11%.

How much change has occurred since 1950? Straus and Bacon's (1953) study does not allow comparison of heavy-drinking rates, but we can compare monthly prevalence (i.e.,

the percentage who drank at all in the prior 30 days). According to Blane and Hewitt's (1977) recalculation of Straus and Bacon's data, 65% of college students in 1949-51 drank once a month or more. The monthly prevalences in the early 1990s is very close, perhaps slightly higher than that figure, depending on the source and how one defines the comparable population. The MTF estimates that, in 1995, 68% of full-time students (1-4 years past high school) in 4-year colleges in 1995 drank in the past month. For 1995, the NCHRBS estimated 68% of all students and 73% of 4-year college students (full-time and part-time) drank in the
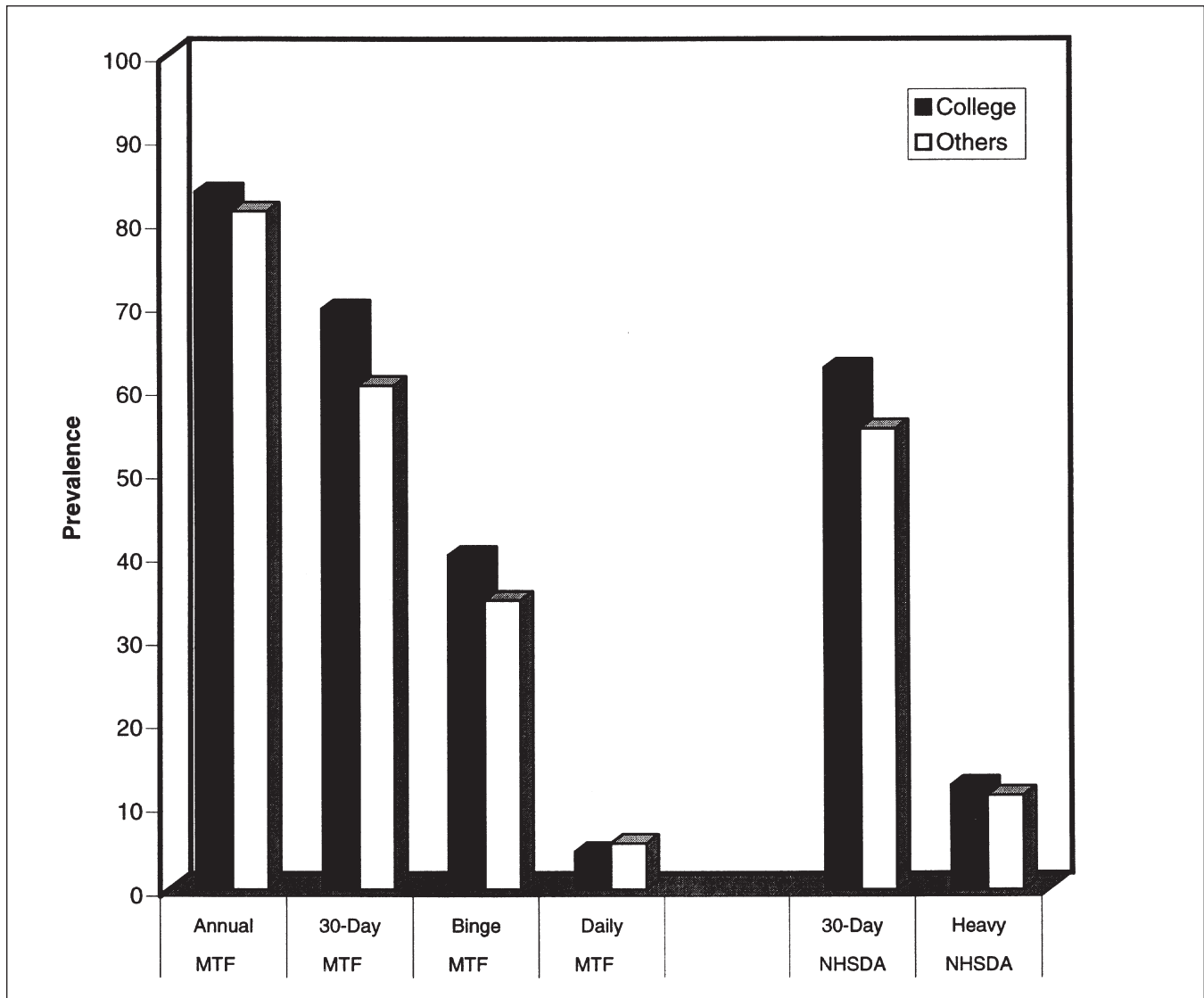
FIGURE 3.   Prevalence of annual, 30-day, heavy and daily alcohol use among college students and noncollege students (MTF and NHSDA)

past month. The CAS estimated that 70% of college stu-
dents did so. Thus there seems fair agreement that the preva-
lence of past 30-day drinking is slightly higher than it was
in midcentury. However, it should be noted that there have
been major changes in the demographic makeup of college
students in that 40-plus year interval. Much higher propor-
tions of females now attend college, as well as higher pro-
portions of racial minorities and, very likely, higher
proportions of lower socioeconomic status groups. It is also
likely that the average age of college students has risen, as
more "nontraditional" students enroll in college. Thus, over-
all, there may have been more change in drinking behavior
than the undifferentiated statistics would suggest. In par-
ticular, because male college students are more likely than
female students to be frequent drinkers, and because fe-
males are a higher proportion of the student population in

recent years, there has probably been somewhat greater
change.

College vs noncollege

Only the MTF project and the NHSDA series have re-
ported comparative national data for both college students
and their age-mates not in college. Figure 3 shows that
college students generally have higher prevalence rates of
alcohol use than their age-mates who do not attend college.
The one exception is for daily use of alcohol: Noncollege
students are somewhat more likely to drink every day. This
is consistent with a pattern of party or weekend drinking
that is likely more descriptive of college students than of
others (although perhaps only slightly so). (The NHSDA
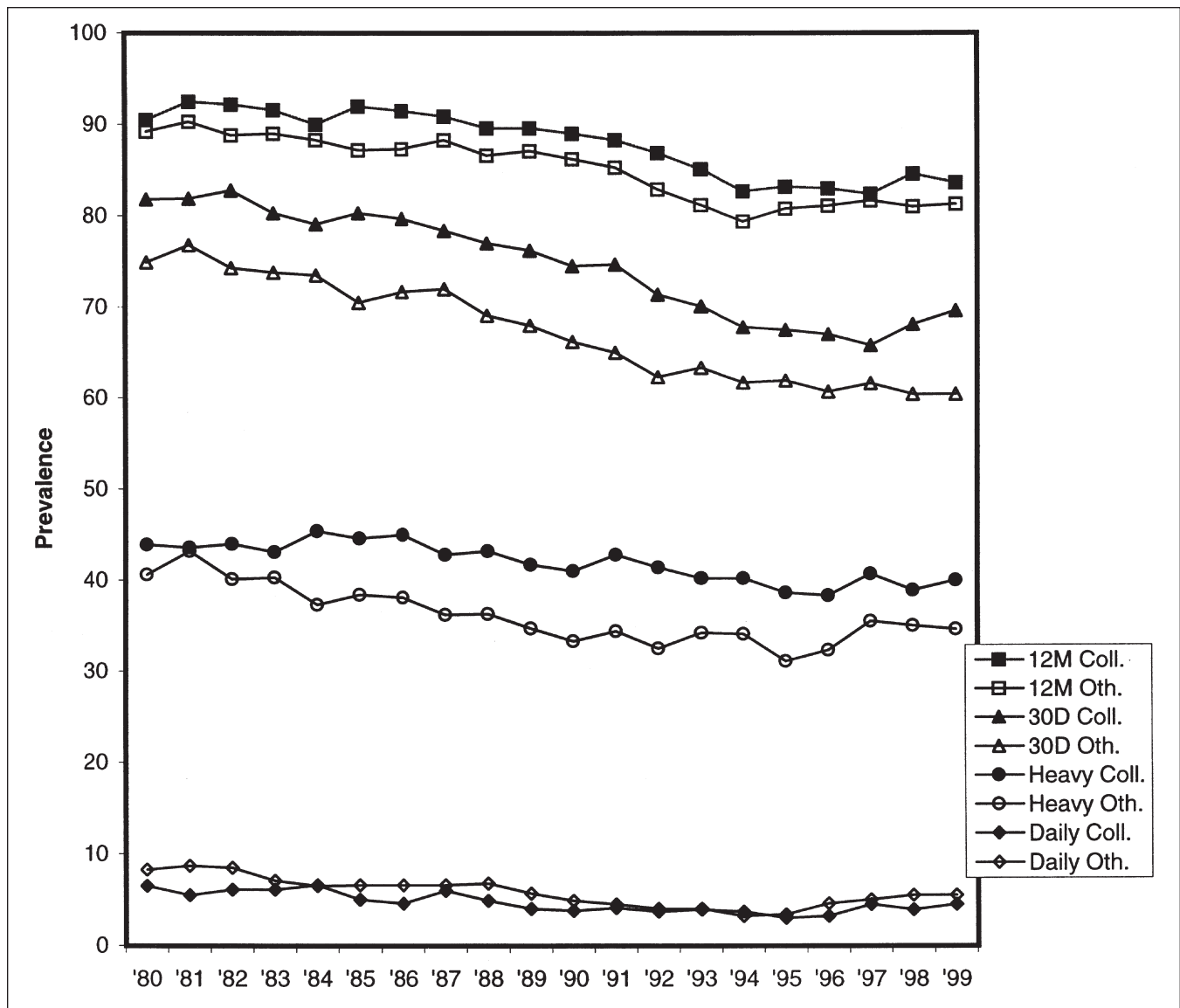data include part-time students in the college student

FIGURE 4.   Trends in annual, 30-day, heavy and daily alcohol use among college students and noncollege students, 1980-99 (MTF)

category, unlike the other data sources discussed in this article; thus, differences between college students and noncollege students in the NHSDA data may be slightly smaller than if part-time students were excluded.)

Trends in college vs noncollege differences

Figure 4 shows the trends in the differences between college and noncollege groups from 1980 to 1999, based on the MTF study. The figure shows that the differences observed in 1999 have been fairly consistently present throughout the period. There is some indication that the difference in heavy-drinking rates increased in the period from 1981 to 1992. Over that interval, heavy drinking dropped by 11 percentage points among the noncollege

group, but by only 2 percentage points among college students. Since 1992 some modest convergence has occurred, as heavy drinking rates held fairly steady among college students but increased slightly among their age peers.

The specific slight divergence in heavy drinking that occurred from 1981 to 1992 suggests that aspects of the college environment supported this behavior to a greater extent than did the environments of noncollege students. One possibility is that college campuses provided some insulation from the effects of changes in minimum drinking age laws that occurred during the 1980s. Also, perhaps there is more commingling of individuals under the legal drinking age with others who are of legal age to purchase alcohol among college students than among their noncollege age peers. Still another possibility is that there may be
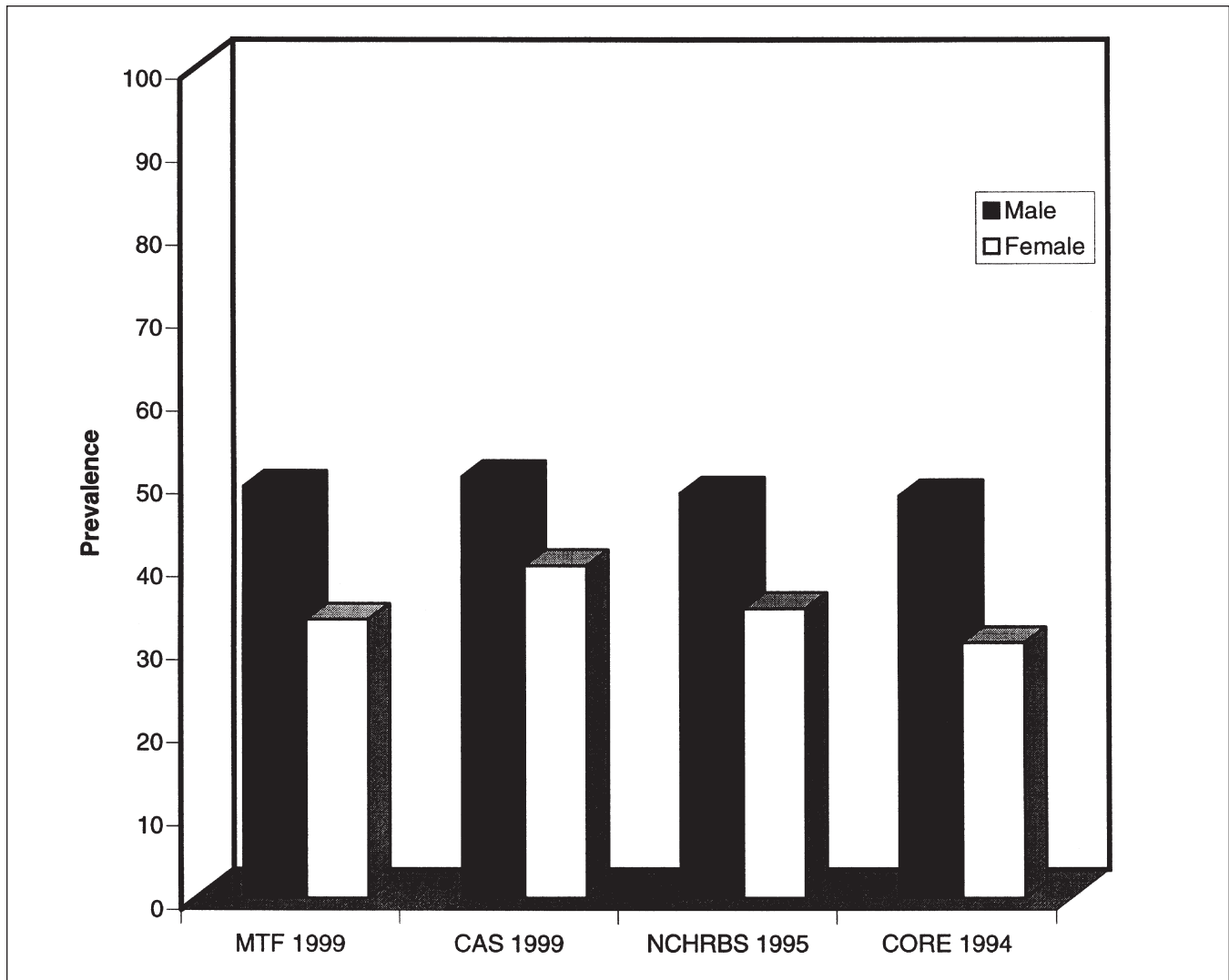
FIGURE 5.   Prevalence of heavy drinking among college students by gender (MTF, CAS, NCHRBS, CORE)

effects of the considerable amount of alcohol advertising that is directed at the college student population (Johnston et al., 2000).

Gender differences

Alcohol use rates are generally higher for male college students than for female college students. CORE data show that "two and a half times as many males (26.4 percent) as females (9.6 percent) reported consuming 10 or more drinks per week" (Presley et al., 1996, p. 13). Figure 5 shows heavy drinking rates from four data sources. These data are quite consistent. The CAS measure of heavy drinking is gender specific (i.e., five or more drinks in a row for males, four or more for females); this explains why this study has the least gender difference, but note that a considerable gender difference remains. The gender differences are rela-

tively, or proportionately, greater for measures of more frequent use. For example, in the MTF study in 1999, 73% of male students drank in the past month compared with 67% of female students, a relative difference of about 9% ([73-67]/67). Having five or more drinks at least once, however, showed a larger difference: 50% among male students and 34% among female students, a relative difference of 47% ([50-34]/34).

Trends in gender differences

Figure 6 shows the trends by gender for several measures of alcohol use from the MTF surveys. The annual prevalence measure shows little difference between male and female college students, but the other measures show consistently higher rates for males than for females. The difference with respect to heavy drinking is particularly
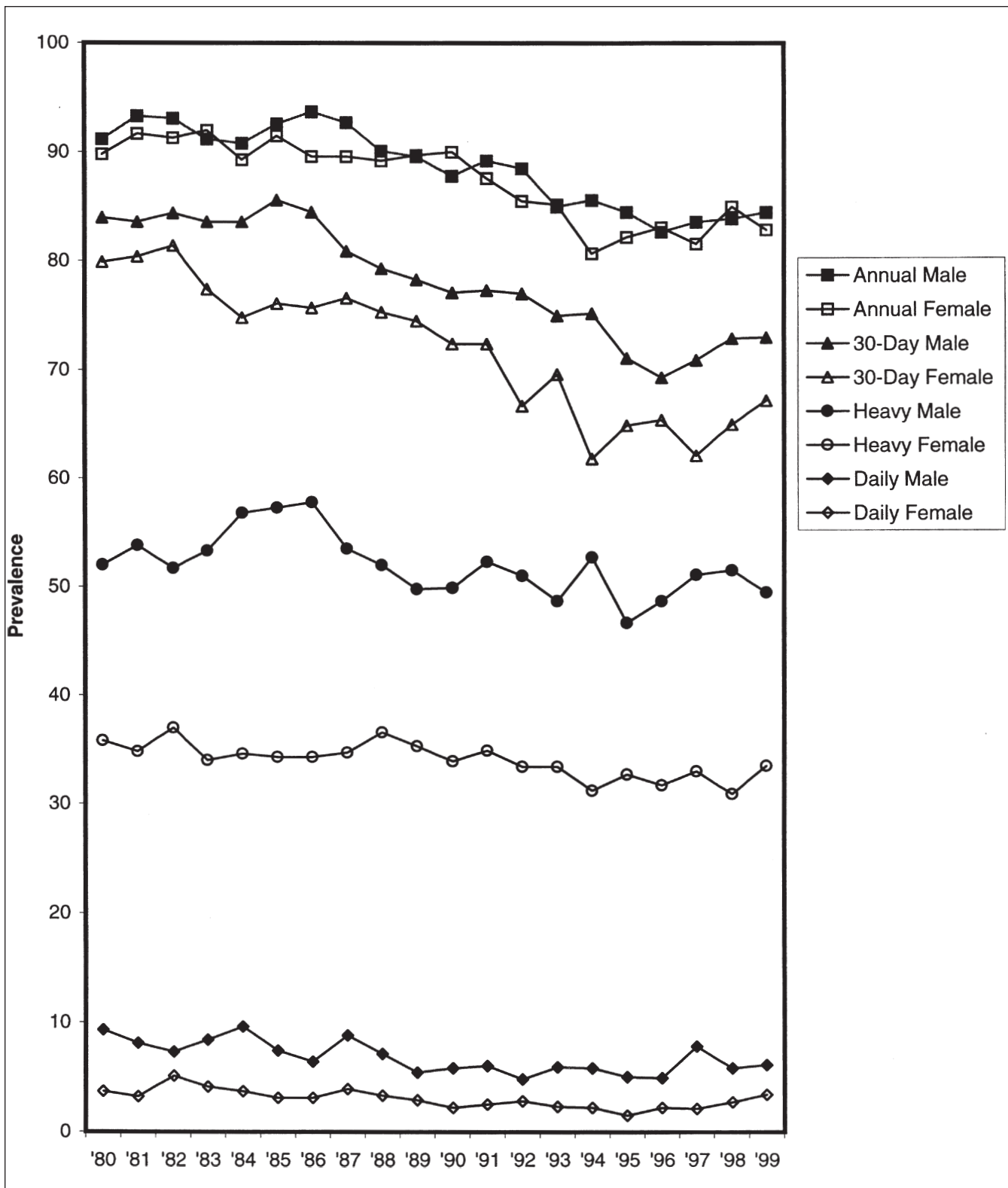
FIGURE 6.   Trends in annual, 30-day, heavy and daily alcohol use among college students by gender, 1980-99 (MTF)
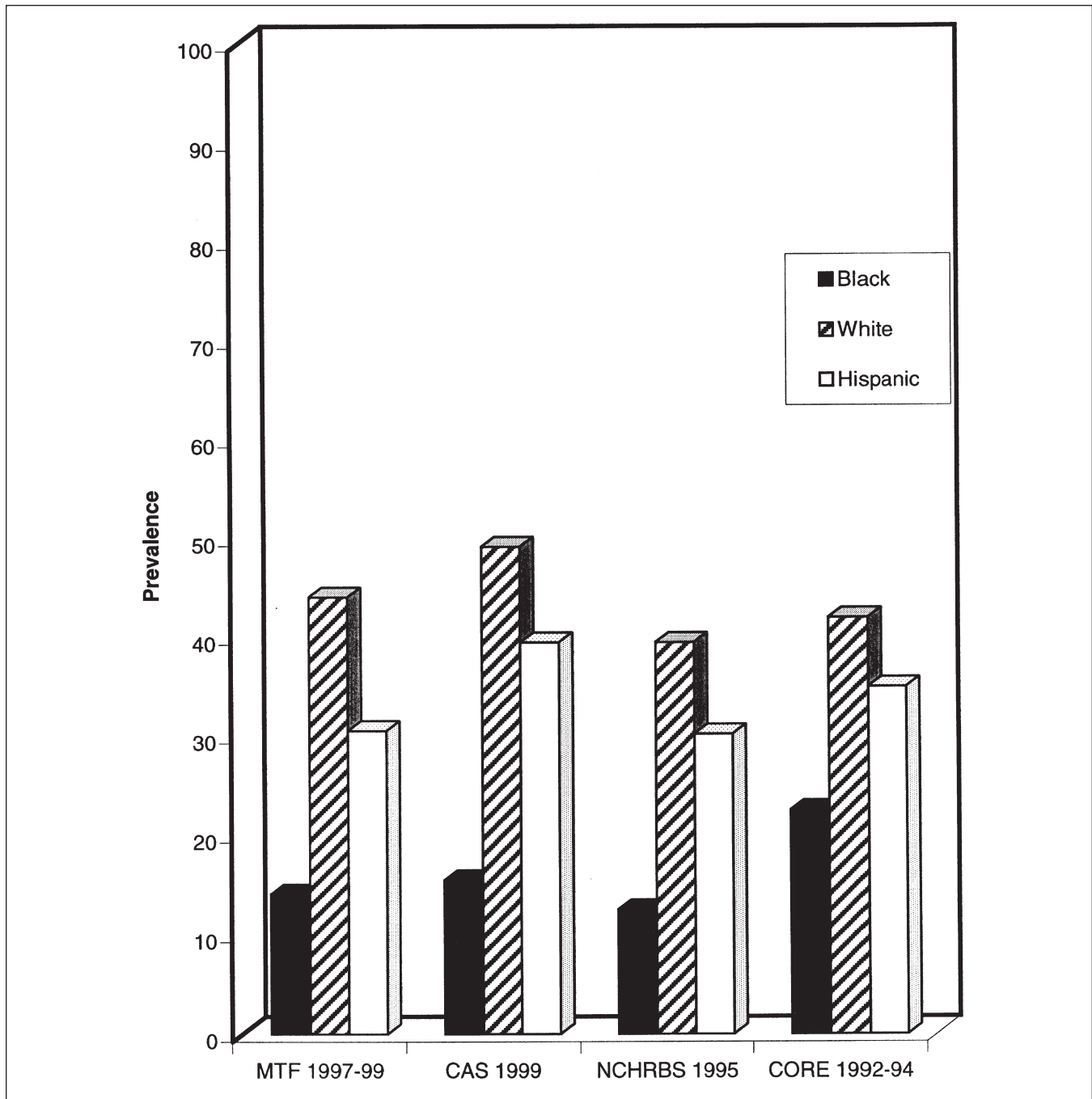
FIGURE 7.   Prevalence of heavy drinking among college students by race/ethnicity (MTF, CAS, NCHRBS, CORE)

striking. This difference may have narrowed somewhat in recent years (mid-1990s compared with mid-1980s); the difference in 1999 of 16% (50% for males vs 34% for females) is lower than the largest difference, 24%, in 1986 (58% vs 34%). It is worth noting the extraordinarily high rates of this dangerous behavior among male college students: about 50% in recent years; among females, the rates have been around 33%.

Race/ethnic differences

Figure 7 shows rates of heavy drinking for three race/ethnic subgroups (i.e., black, white and Hispanic college students) for four of the five data sources. In terms of the validity of the findings, there is reassuring consistency among all four sources: White students are highest in heavy drinking, black students are lowest and Hispanic students are intermediate.
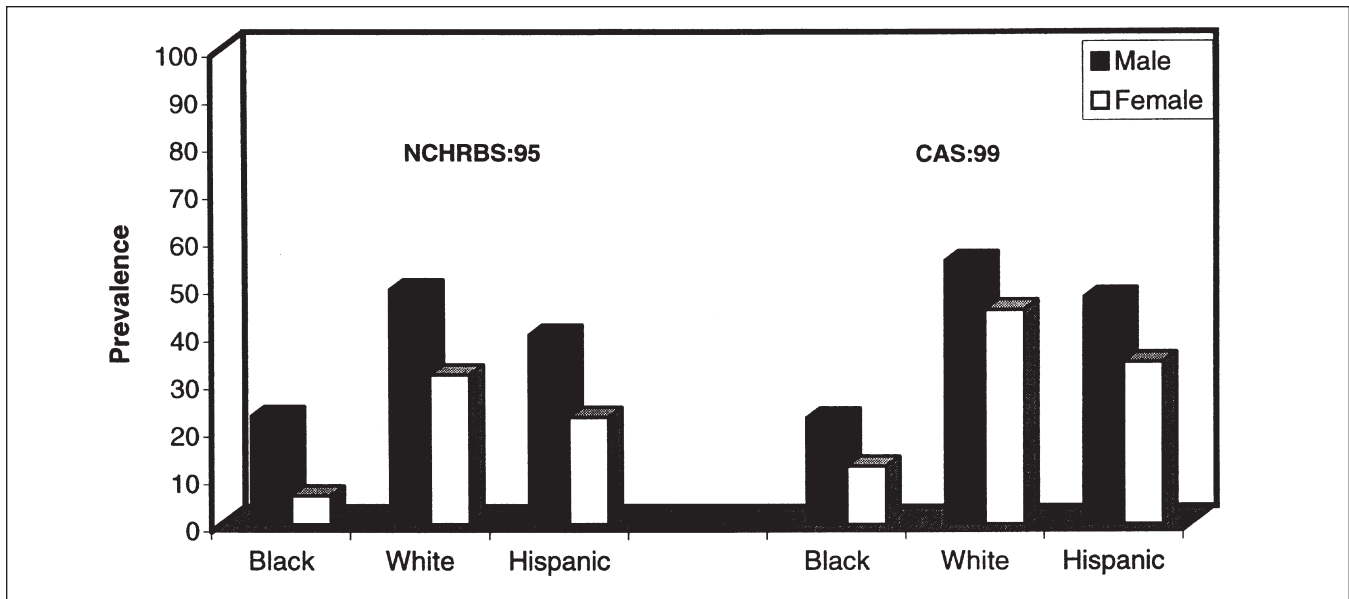
FIGURE 8.   Prevalence of heavy drinking among college students by gender and race/ethnicity (NCHRBS, CAS)

There has been some question as to whether the race/ethnic differences are particularly strong among female students as compared with male students. That is, there is some belief that the difference between male and female minority students is greater than the difference between male and female white students. Figure 8 shows rates of heavy drinking for three race/ethnic subgroups, separately by gender, for two of the data sources (NCHRBS:95 and CAS:99). The differences between the genders in heavy-drinking rates are similar in absolute terms. Indeed, in the NCHRBS data, the difference between male and female heavy drinking rates is exactly 17% in all three subgroups. However, in relative terms, in both studies black women are proportionally less likely to drink heavily compared with black men than are either white or Hispanic women compared with their male counterparts. In the CAS data, the differences are 10%, 10% and 14%, for white, black and Hispanic students, respectively. (Differences are smaller in the CAS data because it uses a gender-specific definition of heavy drinking.)

Trends in race/ethnic differences

The differences in race/ethnic subgroups appear to have been maintained quite consistently since 1980, with little evidence of any systematic change, based on trend data (not shown here) from the MTF study.

Regional differences

One of the advantages of data collected from across the country is that one can examine regional variations in alcohol use by college students. Based on data from general population surveys, one would expect to find some differences in alcohol use among students by region, and that is what Figure 9 shows. As with general population studies, alcohol use rates—heavy drinking in this case—are higher in the Northeast and North Central regions and lower in the South and West. The CAS:99 data and the MTF:97-99 combined data indicate that heavy drinking in recent years is lower in the West than in the South. Regional differences may be of interest in themselves, but it is important to realize the differences could be due to other factors. For example, Wechsler et al. (1997) found that college students in California tend to be somewhat older on average, more likely to be married and less likely to live on campus than students in other areas and that could contribute to the observed differences in alcohol use.

Other drug use

Alcohol is the primary psychoactive drug of choice among college students, but other substances are also used. Figure 10 shows the percentages of college students who are current (i.e., within the last 30 days) users of marijuana, cocaine, cigarettes and alcohol. The several sources are fairly consistent with one another, with the NHSDA data usually showing a little lower estimate. One possible reason for the lower estimates in the NHSDA study is that it uses in-home personal interviews to collect data, whereas the other studies use self-administered questionnaires by mail. Generally, the latter procedures produce higher estimates, presumably because of the greater perceived anonymity of the respondent. After alcohol, cigarettes are the most used substance. It may be surprising to see that about 30% of college students have smoked a cigarette in the
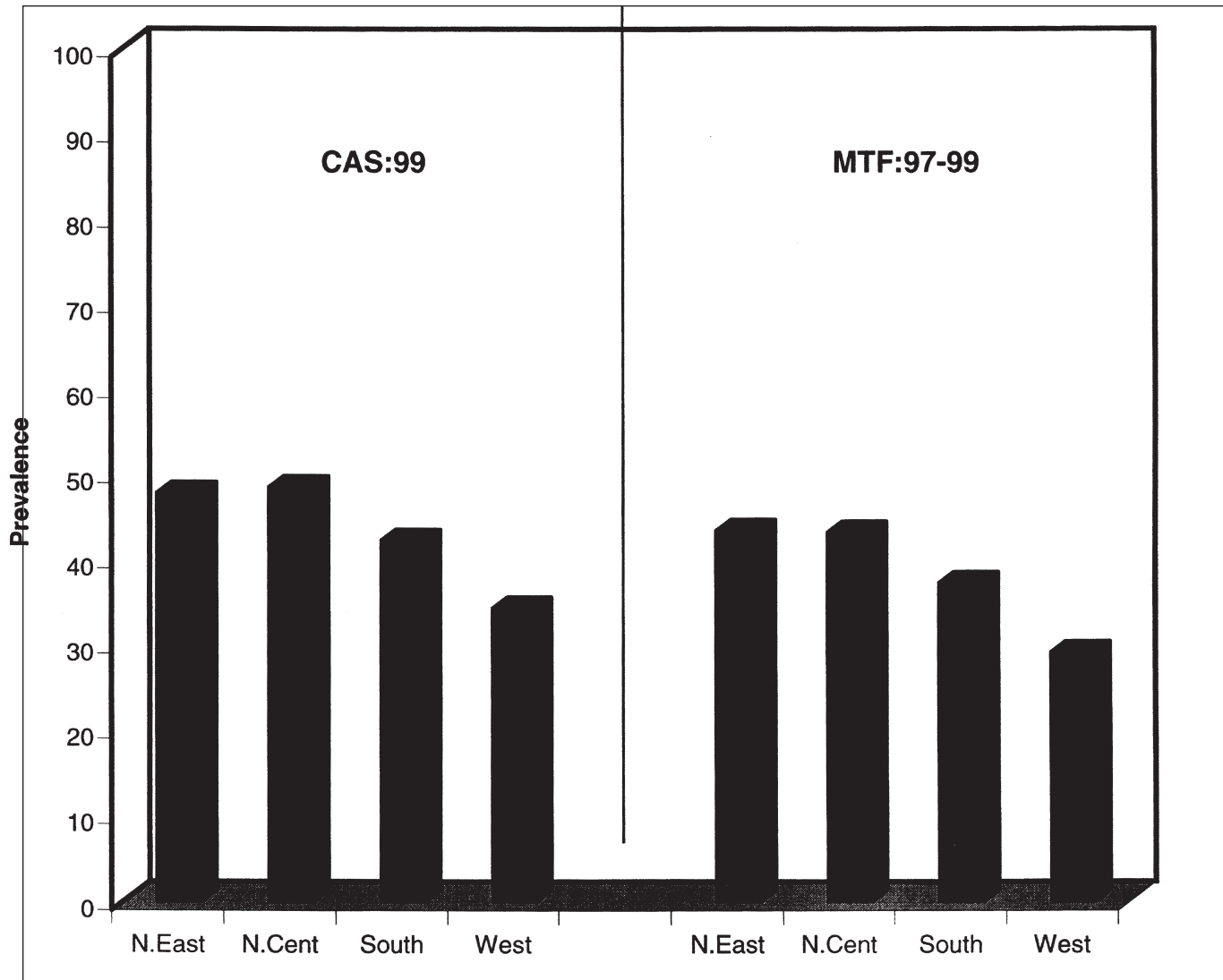
FIGURE 9.   Prevalence of heavy drinking among college students by region (CAS, MTF)

past 30 days, given the substantial amount of information about the harmfulness of smoking. About 20% or less are current marijuana users, although the ordering by year may indicate a rising proportion. Less than 2% report current cocaine use.

Trends in other drug use

Trends since 1980 in current use for marijuana, cocaine and cigarettes are shown in Figure 11. Here there has been some considerable change: About one in three college students in 1980-81 was a current marijuana user. That proportion was cut by more than a half, dropping to less than 15%, in the first 4 years of the 1990s. However, there was an increase in the mid-1990s, with the rate exceeding 20% in 1999.

Cocaine use was fairly stable at about 7% in the early and mid-1980s. There was a sharp decline beginning in the 1987 survey, and use declined through the mid-1990s, reaching as low as 0.6% in 1994. Some slight increases occurred in the mid- and late 1990s.

Cigarette use followed a still different trajectory. Current use was at about one in four college students in 1980, then dropped a bit and stayed fairly flat at between 20% and 25% through 1994. The last few years are showing increased use rates, with the 1999 figure higher than 30%, the highest in the nearly 20 years of trend data. These changes are occurring in large part because of changes (increases) in cigarette use that started among younger adolescents in the early 1990s. These cohorts carried their higher rates of smoking with them through the high school years and eventually into college (Johnston et al., 2000).
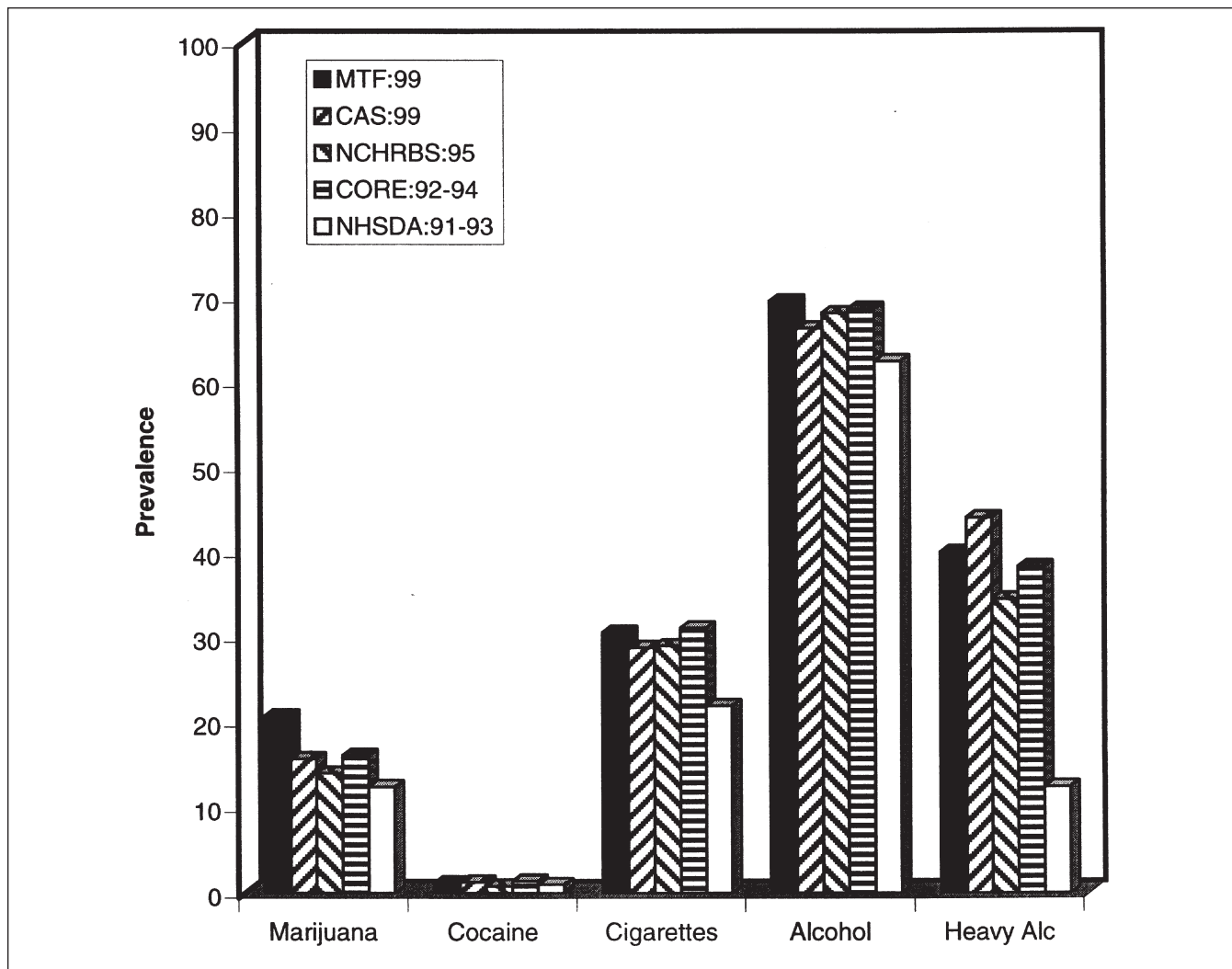
FIGURE 10.   Prevalence of current use of marijuana, cocaine, cigarettes and alcohol among college students (MTF, CAS, NCHRBS, CORE, NHSDA)

Other drug use: College versus noncollege

College students appear to be somewhat more likely than their noncollege age-mates to use alcohol, particularly at the higher levels of use. But what about other drugs? Are college students more inclined to get high with a variety of drugs? Is there something about the college environment that fosters the use of psychoactive substances in general? Or does there appear to be something specific to alcohol?

Two of the studies (MTF:99 and NHSDA:91-93) measure other illicit drugs in similar ways (although the studies differ substantially in methodology), and they include both college students and comparably aged nonstudents. Figure 12 shows a comparison between these groups based on the data from the above studies. The substances compared are marijuana, cocaine, cigarettes and alcohol; heavy drinking

is also compared. The results are quite consistent between the two studies. College students are distinctly higher than nonstudents in alcohol use, but lower in their use of marijuana (except MTF:99), cocaine and cigarettes. The differences for marijuana use are slight, but the differences for cocaine are somewhat greater, in ratio terms. The largest absolute difference is seen for cigarette use, where college students are distinctly lower than nonstudents. Note, however, that the difference is smaller for the MTF data, collected in 1999, than for the NHSDA data, collected in 1991-93. This likely reflects a relative increase in use among college students during the mid-1990s. Both the 30-day prevalence of any alcohol use and the measures of heavy drinking are higher among college students; the NHSDA prevalences of heavy drinking are distinctly lower than those for the MTF data because they are measures of much heavier alcohol use.
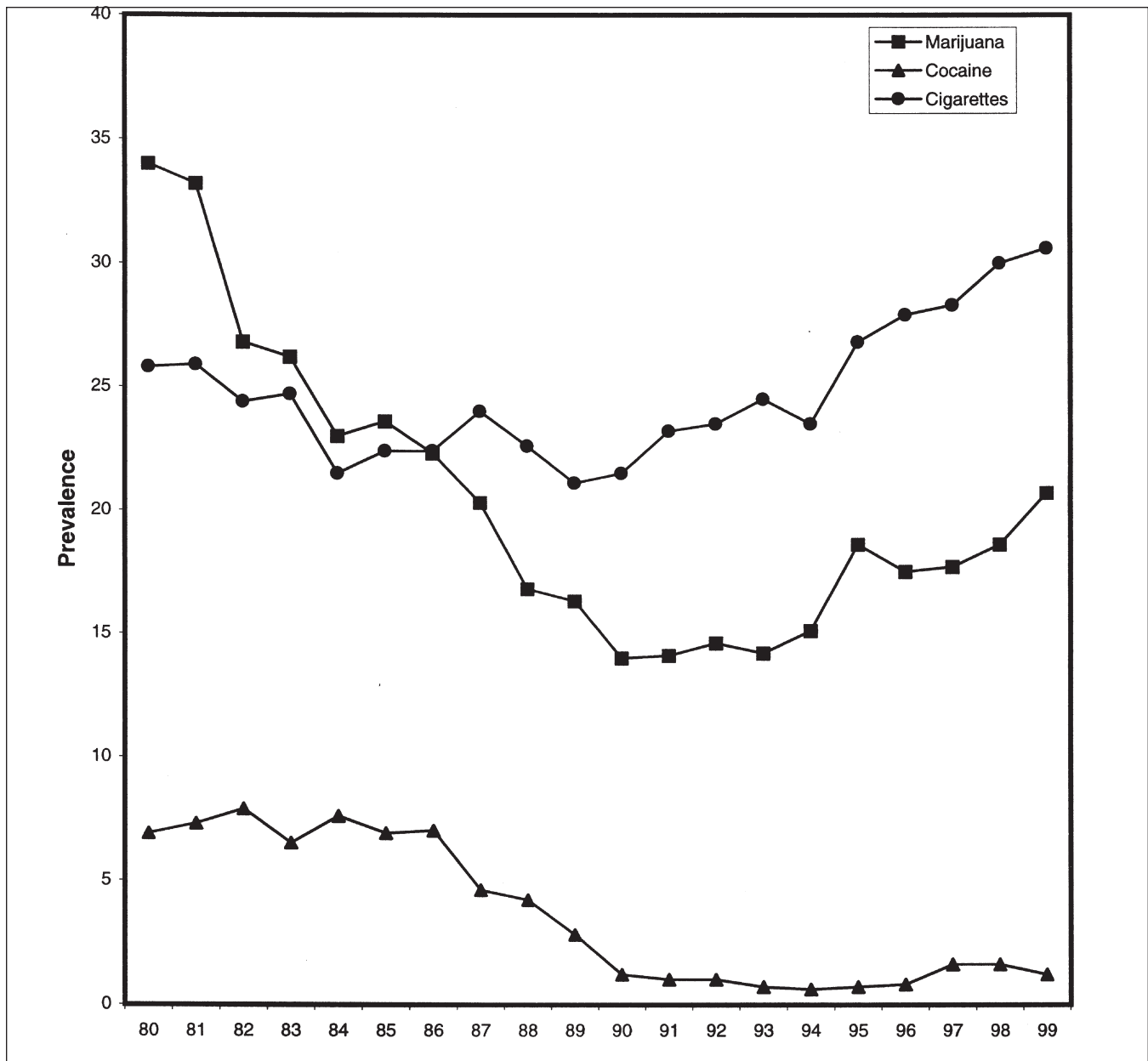
FIGURE 11.   Trends in 30-day use of marijuana, cocaine and cigarettes among college students 1980-99 (MTF)

What are the implications of these differences? Clearly, the greater level of alcohol use among college students does not reflect a general tendency to use more psychoactive substances. This suggests that there are aspects of the college environment that are specific to alcohol and that specifically tend to support alcohol drinking.

Longitudinal panel data

Most of the information on college student drinking practices comes from studies of students after their matriculation. It is of some interest, however, to examine the pattern

of change that occurs from precollege behaviors to college behaviors. It is of interest as well to be able to compare the changes that are occurring among college students with those that are occurring among individuals who did not attend college after high school. The MTF data permit this comparison.

Figure 13 shows the prevalence of heavy drinking at two time points (in the senior year of high school and again 1-4 years later) for two groups (those who are college students at the second point and those who are not attending college full-time at the second point). The data show that, while in high school, those who will later be college stu-
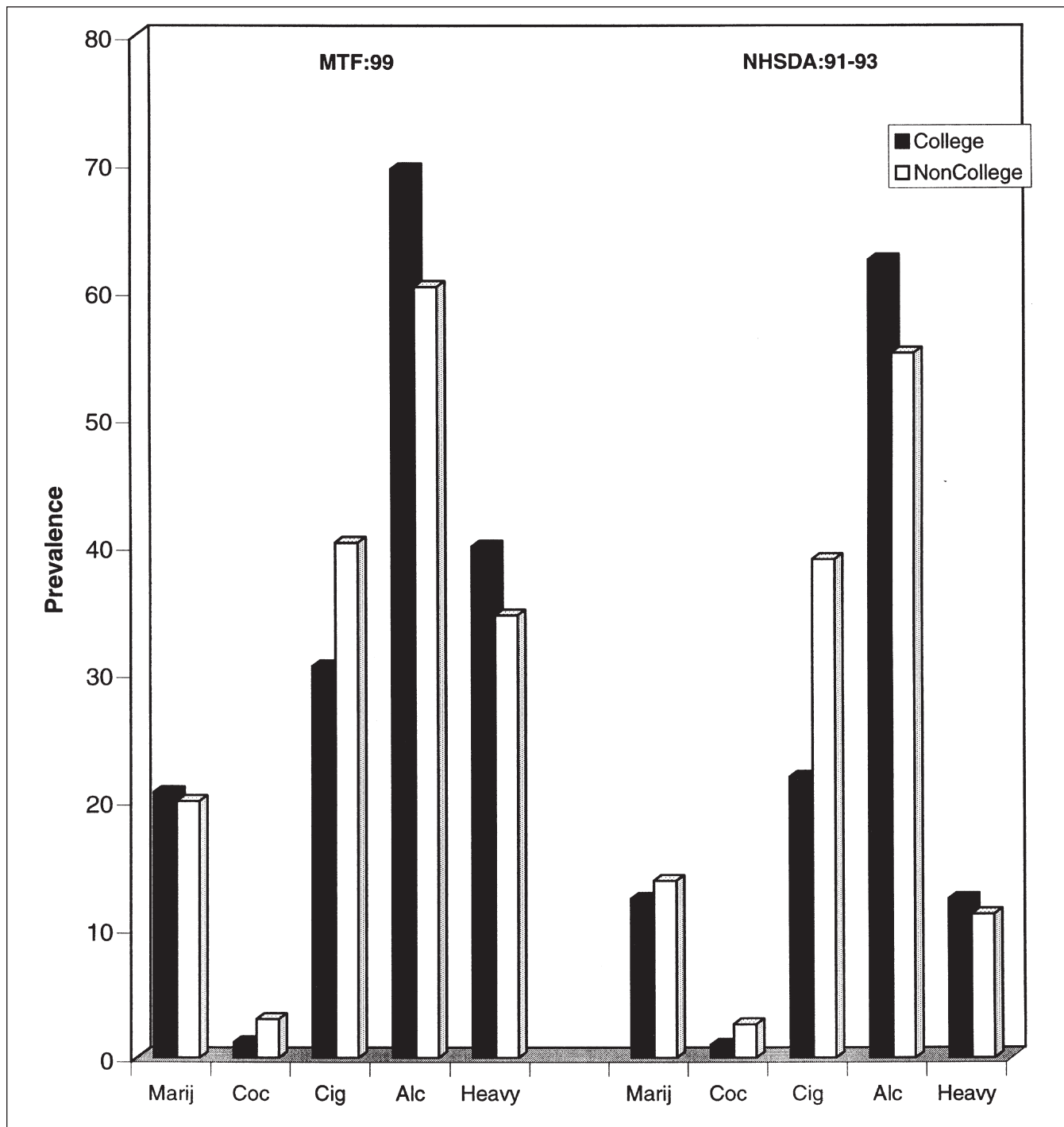
FIGURE 12. Current use of marijuana, cocaine, cigarettes and alcohol among college students and noncollege students (MTF, NHSDA)

dents are lower in their rates of heavy drinking than are those who will not be college students at the later point. Both groups increase their likelihood of being heavy drinkers after high school graduation, but the college students increase distinctly more and actually surpass their nonstudent age-mates.

This finding has important implications. In the absence of longitudinal data, it would not be clear whether the higher drinking rates observed among college students reflected something about the college environment or perhaps reflected only that colleges attracted individuals who were more likely to be drinkers. The longitudinal data support
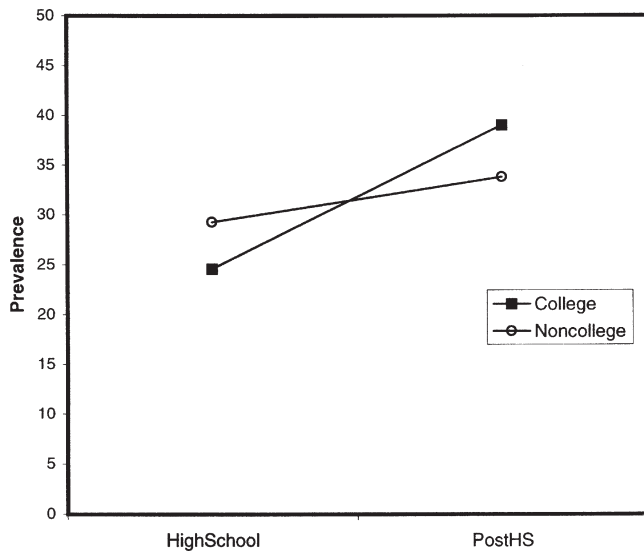
FIGURE 13.　Change in heavy drinking from high school senior year to post high school by college student status (MTF, 1997-99 combined)

an interpretation that suggests that college environments, and other factors associated with being a college student, are instrumental in increasing alcohol use. One important factor is simply that college students tend not to live with their parents. Indeed, excluding married individuals, college students who live with their parents tend to drink less than comparably aged noncollege high school graduates who live with their parents. This is true both at follow-up and in the senior year; that is, high school students who go on to college but live with their parents are lower in heavy drinking rates both during high school and after high school compared with age-mates who do not go to college. Also, college students are more likely to defer marriage, and marriage has a moderating effect on heavy drinking.

The picture is somewhat different for marijuana. College students use less marijuana than nonstudents do, and that was true for them when they were in high school as well, although the gap is narrowed. That is, college students do increase in marijuana use but not enough to close the gap (Bachman et al., 1997).

Data quality: Representativeness and validity

In general, the various data sources appear to provide reasonably good quality data. With the exception of the CORE survey, all the sources utilized probability sampling procedures to obtain representative samples. The CAS, MTF and NCHRBS all suffer from some lack of participation at both the institutional level (colleges in CAS and NCHRBS, high schools in MTF) and the individual level. The NHSDA suffers from some lack of participation at the individual level. However, there is little reason to believe that nonresponse leads to serious nonrepresentativeness of the samples. The proportions of the samples who are nonpar-

ticipants would have to be dramatically different in drinking rates to affect the population estimates substantially. Reasons for nonparticipation by individuals are usually related to factors such as being too busy, being uninterested, having better things to do, and so on. Similarly, reasons for nonparticipation by institutions (high schools or colleges) are usually due to factors such as administrative burden. Thus the nonparticipants are not likely to be dramatically different from participants. Even if we estimate that the nonparticipants might have rates 25% higher than participants, and assuming a 70% response rate, then the overall estimate would be 43% for the entire population instead of 40% among the 70% of students participating. Under the same assumption, the overall estimate of heavy drinkers would be 44% with a 60% student response rate.

Another representativeness issue is relevant to the MTF study. Because it samples high school seniors late in senior year, it does not include high school dropouts. Thus it is not fully representative of the entire age cohort. It is likely that the potential bias with respect to representativeness in the college sample is minimal because exceedingly few high school dropouts would be attending college during ages 19-22. However, the potential bias is greater for the noncollege comparison group because high school dropouts make up a sizable proportion of this group. If one assumes that high school dropouts tend to be heavier drinkers than high school graduates, the effect would be to underestimate drinking in the noncollege sample. This might make the college student sample look more different (i.e., heavier drinkers) than the noncollege sample. In fact, however, it is not entirely clear how much dropouts differ from graduates in drinking rates. Data from the NHSDA:97, comparing 18- to 25-year old high school dropouts with high school graduates who did not attend college, show 25% heavy drinking among dropouts and the same percentage among graduates (Substance Abuse and Mental Health Services Administration, 1999). Thus the bias with respect to alcohol use may not be very large at all.

Finally, it should be noted that all of the sources rely on self-reports. Numerous studies have been conducted in recent decades, almost all of which support the conclusion that largely valid data about substance use can be expected when certain conditions are met (Harrison and Hughes, 1997; Maisto et al., 1990). These conditions include that the respondents have confidence in the confidentiality of their data, they see the research to be "legitimate" and to have scientific or practical value and there are unlikely to be adverse consequences to the individual participants. In addition, reporting is more valid when the data are less sensitive and the behaviors or attitudes can be remembered with a good degree of accuracy. All of these conditions are met in the sources, albeit with some degree of variability. Some might consider reporting of alcohol use to be sensitive, particularly for those respondents who are under the

legal drinking age. However, the fact that large majorities report the behavior suggest that it is not viewed by these individuals as particularly sensitive. Moreover, all the studies provide assurance and appearances that the confidentiality of the data will be protected.

Future of epidemiology of college student substance use

As Table 1 indicates, two of the studies discussed in this article are ongoing, on an annual basis (MTF and NHSDA). In addition, the CAS is continuing on a biennial basis. Thus there will continue to be opportunities to track college student alcohol and other drug use longitudinally, so long as these studies persist. Recently, the U.S. Department of Education has initiated a major new study of college student alcohol and drug use, as well as other behaviors. This study, like the CORE study discussed in this article, is being conducted by Cheryl Presley (PI) at Southern Illinois University. Unlike the previous CORE study, the new study surveys a national probability sample of students. More than 300 institutions are included, 4-year institutions (public and private) as well as 2-year institutions (which were not included in the previous CORE study). About 142,500 students were selected for participation in the first year (spring 2001) of the study. The survey instrument, an extension of the original four-page CORE alcohol and drug survey, includes, in addition to assessments of alcohol and drug use, assessments of violence, harassment, assault issues and policy awareness and enforcement issues.

With all the continuing high-quality measurement of college students' alcohol use, there appear to be in place methods that will permit continued tracking of this behavior with a great deal of accuracy. The challenge, of course, is to develop methods to reduce the behavior.

References

BACHMAN, J.G., WADSWORTH, K.N., O'MALLEY, P.M., JOHNSTON, L.D. AND SCHULENBERG, J.E. Smoking, Drinking, and Drug Use in Young Adulthood: The Impacts of New Freedoms and New Responsibilities, Mahwah, NJ: Lawrence Erlbaum Associates, 1997.

BLANE, H.T. AND HEWITT, L.E. Alcohol and youth: An analysis of the literature, 1960-75. (Prepared for the National Institute on Alcohol Abuse and Alcoholism), PB-268 698, Springfield, VA: National Technical Information Services, PB-268 698, 1977.

CENTERS FOR DISEASE CONTROL AND PREVENTION. Youth Risk Behavior Surveillance: National College Health Risk Behavior Survey—United States, 1995. MMWR **46** (SS-6): 1-56, 1997.

GFROERER, J.C., GREENBLATT, J.C. AND WRIGHT, D.A. Substance use in the US college-age population: Differences according to educational status and living arrangement. Amer. J. Publ. Hlth **87:** 62-65, 1997.

HARRISON, L. AND HUGHES, A. (Eds.) The Validity of Self-Reported Drug Use: Improving the Accuracy of Survey Estimates. NIDA Research Monograph No. 167, NIH Publication 97-4147, Washington: Government Printing Office, 1997.

JOHNSTON, L.D., O'MALLEY, P.M. AND BACHMAN, J.G. National Survey Results on Drug Use from the Monitoring the Future study, 1975-1999, Vol. 2, NIH Publication No. 00-4803, Bethesda, MD: Department of Health and Human Services, 2000.

MAISTO, S.A., MCKAY, J.R. AND CONNORS, G.J. Self-report issues in substance abuse: State of the art and future directions. Behav. Assess. **12:** 117-134, 1990.

PRESLEY, C.A., MEILMAN, P.W. AND CASHIN, J.R. Alcohol and Drugs on American College Campuses: Use, Consequences, and Perceptions of the Campus Environment, Volume IV: 1992-94, Carbondale, IL: Core Institute, Southern Illinois University, 1996.

STRAUS, R. AND BACON, S.D. Drinking in College, New Haven, CT: Yale Univ. Press, 1953.

SUBSTANCE ABUSE AND MENTAL HEALTH SERVICES ADMINISTRATION. National Household Survey on Drug Abuse Main Findings 1997, DHHS Publication No. (SMA) 99-3295, Rockville, MD: Office of Applied Studies, 1999.

WECHSLER, H. AND AUSTIN, S.B. Binge drinking: The five/four measure (correspondence). J. Stud. Alcohol **59:** 122-123, 1998.

WECHSLER, H., DAVENPORT, A., DOWDALL, G., MOEYKENS, B. AND CASTILLO, S. Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. JAMA **272:** 1672-1677, 1994.

WECHSLER, H., FULOP, M., PADILLA, A., LEE, H. AND PATRICK, K. Binge drinking among college students: A comparison of California with other states. J. Amer. Coll. Hlth **45:** 273-277, 1997.

WECHSLER, H., LEE, J.E., KUO, M. AND LEE, H. College binge drinking in the 1990s: A continuing problem: Results of the Harvard School of Public Health 1999 College Alcohol Study. J. Amer. Coll. Hlth **48:** 199-210, 2000.