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Paper 2

Drug Testing in Schools: Policies, Practices, and Association With Student Drug Use

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YOUTH, EDUCATION, AND SOCIETY

OCCASIONAL PAPER

2

Drug Testing in Schools:

Policies, Practices, and Association With Student Drug Use

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ABSTRACT

Despite considerable recent public and judicial attention to the issue of drug testing, little empirical research has focused on the relationship between drug testing in schools and the actual use of illicit drugs by students. To explore this issue, we use school-level survey data about drug testing from the Youth, Education, and Society study and student-level survey data from the same schools participating in the Monitoring the Future study. Using cross-sectional data, we examine how the presence of drug testing relates to 12-month use of marijuana and 12-month use of any other illicit drugs by students.

We addressed this topic in a recently published article in the *Journal of School Health* (Yamaguchi, Johnston, & O'Malley, 2003); this occasional paper extends those analyses by adding another year (2002) of student and school data to the analyses. In a further extension, we examine schools that use random drug testing in which *all* students in the school are subject to testing; this type of drug testing seems most likely to have the intended effects of deterring use.

The extended findings continue to show that (a) relatively few schools report testing students for drug use, (b) there is little evidence of a time trend in the prevalence of student drug testing in American schools between 1998 and 2002, (c) more high schools than middle schools reported the use of drug testing, and (d) most schools that test students report that the testing is "for cause." Of most importance, drug testing still is found not to be associated with students' reported illicit drug use—even random testing that potentially subjects the entire student body. Testing was not found to have significant association with the prevalence of drug use among the entire student body nor the prevalence of use among experienced marijuana users. Analyses of male high school athletes found that drug testing of athletes in the school was not associated with any appreciably different levels of marijuana or other illicit drug use. Cross-sectional data were of necessity used in these analyses. However, we believe the findings to be buttressed considerably by the fact that statistical controls were used for a number of known important risk factors for drug use, which should control for most pre-existing differences; and still no statistically significant differences emerged. Nevertheless, prospective studies would make a stronger case. Policy implications are discussed.

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INTRODUCTION

Drug use among adolescents continues to be an important issue in schools. The level of student drug use has fluctuated over the past 25 years. According to the Monitoring the Future study, the rate of any illicit drug use (including marijuana) reported over the last 12 months among 12th grade students fell from approximately 50% in the late 1970s to an average of 40% in the early to mid-1980s, and further dropped in the late 1980s and early 1990s to a low just under 30% in 1992. Since 1992, the rate of 12-month illicit drug use reported by seniors has gradually climbed to 41% in 2002 (Johnston, O'Malley, & Bachman, 2003). In the "war on drugs," schools have employed a variety of mechanisms to enforce zero-tolerance policies, including drug testing, metal detectors, closed circuit cameras, and sniff dogs. These policies and procedures are often deemed necessary to ensure a safe, drug-free learning environment. In this paper, we focus on drug testing in schools as a means of preventing student drug use.

Drug testing, particularly on a per student basis, can be relatively costly for schools. The cost of drug tests ranges depending on the quality of the test. A standard drug test used in some high schools can range from $14 to $30 per test (Volpert & Tremaine, 1997). A standard drug test detects marijuana, tobacco, cocaine, heroin, opiates, amphetamines, barbiturates, and tranquilizers. These tests are able to detect the presence of drugs from within a few days of use to as long as a week or more, depending on the drug in question (Bailey, 1998). A drug test for steroid use costs $100 per test, and a drug test that meets the National Collegiate Athletic Association (NCAA) standards for accuracy costs over $200 per test (Volpert & Tremaine, 1997). Alcohol is usually not detected by standard urine drug tests, because it leaves the body quickly; hence, it must be detected with a Breathalyzer test shortly after consumption. The high cost of drug testing has been a barrier to implementing such policies in some schools (Dohrmann, 1996), although with increased volume and greater economies of scale, the prices might go down.

Nevertheless, drug testing has been an attractive strategy to some administrators of schools that have an illicit drug use problem because they perceive that drug tests are a reliable and objective way of detecting student drug use. Generally, detecting illicit drug use in adolescents can be extremely difficult (Volpert & Tremaine, 1997). Furthermore, random, suspicionless drug-testing policies are said to remove any subjectivity and arbitrariness that could affect drug-testing policies based upon cause or suspicion (Arnold, 1996).

By using drug tests, schools attempt to create a safe, drug-free learning environment while retaining students' rights to privacy. But schools also need to contend with the legality of drug testing.

Legal Issues of Drug Testing in Schools

Mandatory drug-testing policies implemented by schools have become a legal issue in some areas, as parents have sued schools to uphold students' right to privacy. Parents and their lawyers have argued that mandatory drug-testing policies infringe upon student's Fourth

Amendment rights (Arnold, 1996; Carpenter, 1996; Deivert, 1991; Mahon, 1995; Shutler, 1996). The Fourth Amendment states, "The right of the people to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures, shall not be violated . . ." This amendment requires law enforcement agencies to obtain a warrant to search houses and to have probable cause to search suspects. However, some assert that school settings fall under an exception to the amendment, titled "administrative searches," and thus school administrators are granted greater leeway in the area of search and seizure.

In court cases concerning drug testing in schools, the focus has been on the legality of drug testing. Specifically, the courts have grappled with balancing the individual student's right to privacy versus the school's responsibility to provide a safe, drug-free school environment. Relatively little concern has been given to the effectiveness of drug testing for prevention or cessation, with effectiveness often being assumed.

One of the earliest cases involving drug testing in schools was Schaill v. Tippecanoe School Corporation (679 F. Supp. 833 [1988]). The Tippecanoe school district required random drug testing for athletes, which was contested by two students. The United States District Court deemed the policy constitutional because the school district had a prior problem with illicit drug use among student athletes, and the drug-testing policy clearly stated that a positive drug test would not lead to suspensions or expulsions from school. Instead, students would be referred to counseling. Parents and students were also made aware of the policy and were required to sign a consent form. This case argued that participation in school athletics was a privilege, not a right, in school.

Vernonia School District in Oregon v. Acton (515 U.S. 646) in 1995 became a precedent-setting case (Mahon, 1995). In Vernonia v. Acton, the U.S. Supreme Court upheld suspicionless drug testing of all student athletes. The Vernonia School District had a documented, preexisting drug use problem, particularly among student athletes, which school administrators claimed led to severe disciplinary problems in schools. In addition, the school district had already tried several prevention programs unsuccessfully. In the district, 60%-65% of the high school students participated on an athletic team, along with nearly 75% of the elementary and middle school students (Pittman & Slough, 1996). In this case, drug testing of student athletes became established as constitutional because the U.S. Supreme Court stated that student athletes already had lower expectations of privacy and their safety could be affected by drug use.

For Earls v. Tecumseh Public School District (115 F. Supp. 2d 1281) in 2000, the U.S. District Court for the western district of Oklahoma upheld mandatory, random drug testing of students who participate in any extracurricular activity, not just athletics. This district court upheld the school's drug-testing policy not because drug use was a particularly severe problem in the Tecumseh Public School District, but because drug use was a problem in our society in general, including in schools. The court stated that drug use thwarts the mission of schools and disrupts the learning process for all students, and drug use among adolescents poses even more severe health consequences than for adults. The district court argued that a school should be able to take preemptory measures to combat drug use rather than wait until a problem does reach epidemic proportions. Drug testing of students who participate in any extracurricular activity was

again upheld in Joy v. Penn-Harris-Madison (212 F.3d 1052) in 2000 and extended the scope of illicit drug testing to students who drive to school (McCarthy, 2001).

Most recently, in 2002, in the case of Earls v. Tecumseh School District (536 U.S.), the Supreme Court continued to uphold school district rights to drug test students who participate in extracurricular activities. Justice Thomas delivered the opinion of the court, making four main points in favor of schools. First, "a finding of individualized suspicion" is not necessary because of the school's custodial and tutelary responsibility for all students. Second, participation in nonathletic extracurricular activities, as characterized athletes in the Vernonia case, diminishes the expectation of privacy. Third, drug testing through urinalysis is not an invasion of student privacy, given the school policy. Under the policy, a faculty or school staff member waits outside the closed restroom, the tests are kept confidential, and positive results are not turned over to any law enforcement. The only consequence to a positive test result is to limit the student's privilege of participating in extracurricular activities. Fourth, the Tecumseh drug-testing policy serves the school district's interest in protecting its students' safety and health. Justice Thomas concluded, "Given the nation-wide epidemic of drug use, and the evidence of increased drug use in Tecumseh schools, it was entirely reasonable for the School District to enact this particular drug testing policy."

While the courts have tended to decide in favor of schools wishing to test, some cases have sided with students' right to privacy. For example, in Willis v. Anderson Community School Corporation (158 F.3d 415) in 1998, Willis served a suspension period for fighting at school. Upon Willis's return to school, he was required to provide a urine sample. When he refused, he was suspended again. If he had refused and been suspended a third time, Willis would have been expelled from school altogether. The Seventh Circuit Court struck down the school policy of drug testing students who had been suspended for fighting at school (Dowling-Sendor, 2000).

Overall, the literature on drug testing in schools has focused on the balance between student safety and health versus constitutional rights. Deivert (1991) states,

> By carefully structuring a monitoring program an institution can go a long way toward striking an appropriate balance between helping the student athlete protect his (her) health and the health of others, while ensuring that the athlete's fundamental constitutional liberties are not compromised in the process. (pp. 39-40)

The legal system has quite thoroughly discussed the constitutional and security aspects of student drug testing; however, there are very few empirical studies that have examined the effects of drug testing on students. The following is a review of the published literature that has examined the effects of drug testing in schools.

Educational Issues of Drug Testing in Schools

The argument for drug testing. The Vernonia School District v. Acton case in 1995 was probably the most groundbreaking drug-testing case to be won by a school district. The decision upheld the use of random, suspicionless drug testing of student athletes. According to the Department of Justice report, the Vernonia policy was deemed effective because some teachers

noted a decrease in drug use and an improvement in discipline (Department of Justice, 1996). Unfortunately, no empirical study was conducted among the students in the Vernonia school district to measure their actual drug use rates. Judgments about the effectiveness of the drug-testing policy on reducing student drug use had to be based on anecdotal evidence.

The Office of National Drug Control Policy asserts that drug testing in schools has been extremely effective at reducing drug use and, most importantly, deterring drug use among adolescents (Office of National Drug Control Policy, 2002). In a case study of Autauga County School System in Alabama, drug testing in schools was attributed to significantly decreasing tobacco use among 8th graders from 35.9% to 24.4%, alcohol use from 39.9% to 30.0%, and marijuana use from 18.5% to 11.8%. In another case study of Hunterdon Central Regional High School in Flemington, New Jersey, Principal Lisa Brady concluded that a random drug-testing policy at her school worked; for example, cocaine use among seniors at Hunterdon Central High School dropped from 12% to 4%. In 2000, the school had to suspend their random drug-testing policy due to legal suits. Principal Brady noted that the drug problem in her school had "gotten worse" (Office of National Drug Control Policy, 2002, p. 12).

In an attempt to systematically examine the effectiveness of drug testing, James and Moore (1997) studied 296 adolescents in an outpatient clinic in the Pacific Northwest. These adolescents had established alcohol, tobacco, and other drug (ATOD) use problems and had parental support for drug testing. The researchers found that drug testing was reliable for detecting drug use but not necessarily the amount or frequency of use. Drug testing was an effective tool in helping to prescribe appropriate treatment strategies for these youth with preexisting ATOD abuse problems. The authors concluded that a strategic and pragmatic use of drug testing via urinalysis could bring about positive behavioral changes leading to attitudinal and motivational changes in drug-using adolescents (James & Moore, 1997). However, generalizing from this study to the population of students in schools is probably unwise since the adolescents in this study were not randomly selected. These youths were identified due to their involvement in a treatment program for their established drug abuse problem. In addition, the parents were fully supportive of the treatment program's drug-testing policy, and such support is often not the case in schools.

Arguing from a juvenile criminal justice standpoint, Crowe and Syndey (2000) point out that adolescent drug-testing programs have the potential to save money in the long run. Specifically, Crowe and Syndey (2000) believe that if "youth are able to enter recovery and maintain abstinence through treatment, they are less likely to cycle through the system multiple times. Identifying youth who need treatment and obtaining it for them may save money in misused correctional programs" (p. 6). Similarly, Lashey (1994) proposed that drug testing, particularly for use in assessment, is beneficial because adolescents are more likely to overcome denial and to discuss their substance use problems.

Walker (1993) surveyed 86 male and female students from intercollegiate athletic teams, including cheerleading squads. Walker (1993) studied how a drug-testing policy in a specific school district influenced high school students' drug use behavior and attitudes about the drug-testing program. Walker (1993) found that the most common reason for athletes to abstain from or stop using illicit drugs was concerns over their health. Other reasons for abstaining or stopping

drug use included (a) not desiring the effects of illicit drugs, (b) not enjoying the use of illicit drugs, and (c) not finding a need to use illicit drugs. Overall, athletes were not concerned with getting caught using drugs. Among the student respondents, 49% strongly disagreed that random drug testing was effective for deterring their substance use either during the athletic season or the off-season, while 36% strongly agreed that random drug testing deterred them from using drugs. Walker also gave students opportunity to comment on the drug-testing policy in an open-ended format. The responses were mixed; some students felt the policy was beneficial, while other students commented that the policy did not accomplish the intended goal. However, none of the students remarked about feelings of mistrust or antagonism towards the school or administrators because of the drug-testing policy.

In testing the effects of mandatory, random drug testing among high school athletes, Goldberg and his colleagues (2003) reported preliminary results of the Student Athlete Testing Using Random Notification (SATURN) study. The authors studied two high schools in Oregon in the 1999-2000 school year: one school implemented mandatory drug testing (DT) for athletes, and another high school was used as a control. Students in each school completed pre- and post-test questionnaires regarding their illicit drug use, steroid use, attitudes toward school, and other risk factors associated with illicit drug use. Thirty percent of the athletes in the DT school were tested during the year. Analyses of the posttest questionnaires indicated that athletes in the DT school had lower self-reported steroid and illicit drug use than athletes in the control school. However, there are several issues of concern with this pilot study. First, the generalizability of the study is questionable because the study compares only two schools in Oregon. A second issue is that there was high attrition (only 57% of athletes returned the posttest) in the DT athlete sample. A third issue is that drug testing resulted in higher negative attitudes toward school and greater risk factors for using illicit drugs among DT athletes, contrary to what the program intended.

The argument against drug testing. Since the Vernonia case, much criticism has arisen from legal and ethical perspectives of the Supreme Court's reasoning in deciding this case (Carpenter, 1996; DeMitchell, 1995; Shutler, 1996; Stefkovich & O'Brien, 1997). For example, in an editorial, Wald (2002) argued that drug-testing policies could in fact be setting barriers for students, particularly marginal students, to participate in extracurricular activities or sports for fear of being drug tested.

In reviewing the Vernonia v. Acton case, Stefkovich and O'Brien (1997) argued that drug testing could lead to mistrust and resistance from students and thus inadvertently perpetuate problems, particularly in urban schools. In their review, the authors did not seek to determine students' perceptions of the drug-testing policies.

Hutton (1992) argued that too often schools employ a drug-testing policy for symbolic reasons. For example, schools may implement a drug-testing policy because drug use is a serious national concern or to set an example for a zero-tolerance policy, rather than basing the policy on well-defined local drug problems in a particular school or district. Hutton (1992) contends that a drug-testing policy sends a message of mistrust and sets the stage for an antagonistic relationship between the school and the students. While Hutton (1992) argues against enacting a drug-testing policy for merely symbolic reasons, school drug testing was still very rare in the 1990s (DeMitchell & Carroll, 1997; DeMitchell, 1995; Taylor, 1997). Further, many school districts

that do have a drug-testing policy have documented student drug use problems in their specific schools (e.g., Schaill v. Tippecanoe School Corporation, 1988; Vernonia v. Acton, 1995; Todd v. Rush County Schools, 1997; Joy v. Penn-Harris-Madison, 2000). Similar to Stefkovich and O'Brien (1997), Hutton (1992) did not interview or survey students to empirically determine feelings of mistrust in students.

Taylor (1997) argued that drug testing could have a "compensating behavior" effect. Taylor believes that a drug-testing policy may lead marginal student athletes who consequently quit the team to continue, or perhaps increase, their drug use. Taylor, however, theorizes about student behaviors without an empirical study of student perceptions, attitudes, or behaviors.

DeMitchell and Carroll (1997) asked 100 school superintendents whether they were familiar with recent court cases on school drug testing and what opinion they held on the effectiveness of mandatory drug-testing policies. The authors found that 82% of superintendents were familiar with drug-testing court cases and the decisions in favor of school drug testing. Yet, 79% of respondents were not considering a mandatory drug-testing policy for their school district. Just over half of the superintendents (51%) felt that drug testing was not effective in preventing student drug use. And while 24% of the superintendents believed that drug testing was an effective means of preventing student drug use, less than 4% of those who favored drug testing had a mandatory drug-testing policy in their school district. DeMitchell and Carroll (1997) point out that while superintendents do seem to be informed of school-related court cases and their outcomes, they do not necessarily make policy decisions in accordance with court rulings. According to the authors, "other factors, possibly political considerations of the culture of the school district, the local size of the problem addressed by the court case, prevailing normative views of the role of the school, financial restraints, views of what is professional, and the sheer competition of other agenda items impact the decision of whether to follow the lead of a court case" (DeMitchell & Carroll, 1997, p. 65). Clearly, however, questions about the effectiveness of testing weigh heavily in their considerations, and the issue of drug testing needs to be empirically investigated to determine its effectiveness and value in schools.

Purpose of the Study

The issue of drug testing has been a "slippery slope" (Dowling-Sendor, 1999) for educators, policymakers, and researchers. While most courts have found school drug testing policies to be legally permissible, much controversy still ensues over the appropriateness of drug testing in schools (Bailey, 1997; Hutton, 1992). One area of significant controversy regards targeting various testing populations: Is it better to test only students suspected of drug use, to do random drug testing of particular groups of students (e.g., athletes) (Arnold, 1996; DeMitchell, 1995), or to go further and randomly test all students?

Unfortunately, little past empirical research has actually examined the utility of drug testing. For example, drug tests are used mostly with student athletes and students involved in extracurricular activities, even though these student groups have the lowest reported drug use rates (Bailey, 1998). In addition, the initiation of a school drug-testing policy is often because of an identified drug problem in the school, but very little evaluation has been conducted to determine if the drug-testing policy is effective in reducing the drug problem in school. In fact, some legal analysts believe that a drug-testing policy may actually increase or further the

problem of drugs in schools (Stefkovich & O'Brien, 1997; Taylor, 1997). According to DeMitchell and Carroll (1997), "Court decisions are not necessarily the barometer of educational policy making. They are important, but they are not enough to carry the entire load of policy making. School superintendents keep abreast of major court decisions, but those decisions do not necessarily dictate action, unless they are a party to the lawsuit" (p. 66). Hence, more empirical research is needed to help administrators make informed decisions about drug testing in schools.

The purposes of this study are (a) to provide a synopsis of the trends in school drug testing between 1998 and 2002 in order to provide some idea of the extent to which such policies are actually being used and (b) to examine the association between drug testing and reported drug use by students. We address the following research questions:

1. What percentage of schools employ a drug-testing policy?
2. Which students are tested for drugs in these schools?
3. On what basis are students made eligible for drug testing in schools?
4. How do characteristics of the school and its student body relate to whether or not it has drug testing?
5. What is the relationship between school drug testing and student drug use, controlling for the characteristics of the student body?

METHOD

Sample

Data for these analyses were obtained through two related studies. The student data were obtained from the Monitoring the Future (MTF) study (supported by the National Institute on Drug Abuse), consisting of nationally representative samples of 8th, 10th, and 12th grade students (Johnston et al., 2003). Data on school characteristics, including the drug-testing policies, were obtained from administrators (usually the principals) of the relevant MTF schools under a separately funded research project, the Youth, Education, and Society (YES) study (supported by the Robert Wood Johnson Foundation). The half-sample of nationally representative schools that were cycling out of the MTF study each year provided the target samples for the current study. From 1998 through 2002, self-administered questionnaire data were collected from approximately 35,000 8th grade students in 323 schools, 32,000 10th grade students in 282 high schools, and 27,000 12th grade students in 289 high schools. Data were subsequently collected from most (894) but not all of those schools, providing the data that were analyzed here; and a few of those cases had missing data on the questions about drug testing.

Two subsets from the 10th and 12th grade high school student sample are examined separately in this paper. One subset is comprised of male athletes, defined as those students who reported participating in school athletic teams to a great extent (approximately 4,000 male athletes in 297 high schools). This smaller number of schools having male athletes results from both the fact that not all students were sampled in all schools surveyed and, more importantly, the fact that the question about athletic participation was contained in only two of the six questionnaire forms administered to each grade. Thus, while nearly all high schools surely would have male athletes, those athletes fell into our student sample in only 297 of the 571 high schools.

The second subgroup to which special analytic attention is paid here is comprised of experienced marijuana users, defined as those students who reported using marijuana on 20 or more occasions in their lifetime. That subgroup is comprised of approximately 10,400 students in 557 high schools.

Procedures

Data were collected cross-sectionally over five years, from 1998 through 2002. Students were surveyed using self-administered questionnaires in their classrooms (supervised by MTF personnel) regarding their alcohol, tobacco, and other drug use, as well as related attitudes and behaviors. School principals or other school staff completed a mailed self-administered questionnaire focused on school programs and policies regarding alcohol, tobacco, and other drugs. The response rate across five years from principals in the YES study was 82.4%, and from the MTF students in these participating MTF schools was 87.5% (see Table 1).

Outcome Measures

Student drug use. Students completed self-administered questionnaires from the MTF study regarding their drug use. Specifically, marijuana use over the past 12 months was assessed on a 7-point scale (1 = 0 occasions, 2 = 1-2 occasions, 3 = 3-5 occasions, 4 = 6-9 occasions, 5 = 10-19 occasions, 6 = 20-39 occasions, and 7 = 40 or more occasions). A binary variable for 12-month marijuana use was created (0 = no use, 1 = use). Students were also asked about other illicit drug use over the past 12 months, including LSD, other psychedelics, cocaine, heroin, amphetamines, and tranquilizers. A mean was taken from these items to create a single scale of illicit drug use (other than marijuana), on the same 7-point scale. A binary variable for 12-month other illicit drug use was created (0 = no use, 1 = use).

School-Level Measures

Drug-testing policy in schools. School officials were asked, "In the [date] school year, did your school test any students for illicit drug use?" If the answer was "yes," the respondent was directed to follow-up questions regarding the school's drug-testing policies. Drug testing of any kind is a binary variable (0 = no testing, 1= any drug tests).

Drug testing and students. School officials were asked which groups of students were drug tested within the school year. These questions were added to the YES survey in 1999. The groups of students included the following categories: students participating on an athletic team (not including tests for performance-enhancing drugs), students in other extracurricular activities, selected students based on suspicion or cause, students on school probation, students who volunteered to be tested, all students, and "other." School officials were asked to mark all that apply.

Of particular interest was drug testing students participating on an athletic team. Drug testing student athletes is a binary variable (0 = no testing, 1 = any testing of student athletes).

Reasons for drug testing. Schools were asked the reason for drug testing students. They were asked to select from the following reasons: based on suspicion or cause, routine drug

testing, students or their parents volunteered, mandated testing, and "other." School officials were asked to mark all that apply.

Random drug testing with all students being eligible to be tested was determined by follow-up telephone interviews. Schools that marked "routine" or "mandated" as a reason for drug testing received follow-up phone calls asking whether or not the school conducts random drug tests in which *all* students are eligible to be selected for testing.

Of particular interest were two reasons for drug testing: for-cause (based on suspicion or cause) and random. The two reasons for drug testing are binary variables, where 0 = no testing for cause, 1 = any for-cause testing, and 0 = no random testing, 1 = random testing.

School characteristics. Demographic information about the schools was gathered from an administrator—usually the principal—or other school staff. Schools are characterized by their grade (8^{th} grade = middle school, 10^{th} and 12^{th} grade = high school), sector (public or private), population density (from census classification of large Metropolitan Statistical Area [MSA], other MSA, or non-MSA), number of students in the grade being surveyed (< 75 students = small school size, 75-225 = medium, > 225 = large), socioeconomic status (< 15% proportion of students with free or reduced lunch programs = high SES, 15%-39% = middle, ≥ 40% = low), region (from census classification of Northeast, North Central, South, or West), and majority race/ethnicity (predominantly White school [≥ 66% White students in school], African American school [> 50% African American students in school], Hispanic school [> 50% Hispanic students in school], or other school).

Student-Level Measures

Student characteristics. Student characteristics that have been shown to have strong relationships to drug use were used as control variables (Brown, Schulenberg, Bachman, O'Malley, & Johnston, 2001).

- Students reported measures of *race* (African American, Hispanic, White, or other) and *gender*.

- Parental educational attainment, a proxy for student *socioeconomic status*, was a composite item based on the average of the father's and mother's educational level ("What is the highest level of schooling your mother/father completed?" 1 = completed grade school or less, 2 = some high school, 3 = completed high school, 4 = some college, 5 = completed college, 6 = graduate or professional school after college). One missing data case was allowed.

- *Religiosity* was measured by a composite of two items ("How often do you attend religious services?" 1 = never, 2 = rarely, 3 = once or twice a month, 4 = about once a week or more; "How important is religion in your life?" 1 = not important, 2 = a little important, 3 = pretty important, 4 = very important).

- *Truant behavior* was a composite of two items ("During the last four weeks, how often have you gone to school, but skipped a class when you weren't supposed to?"

1 = not at all, 2 = 1-2 times, 3 = 3-5 times, 4 = 6-10 times, 5 = 11-20 times, 6 = more than 20 times; "During the last four weeks, how many whole days of school have you missed because you skipped or 'cut'?" 1 = none, 2 = 1 day, 3 = 2 days, 4 = 3 days, 5 = 4-5 days, 6 = 6-10 days, 7 = 11 or more days).

- *Grade point average* was measured on a 9-point scale ("Which of the following best describes your average grade in this school year?" 1 = D, 2 = C-, 3 = C, 4 = C+, 5 = B-, 6 = B, 7 = B+, 8 = A-, 9 = A).

- *College plans* were assessed by the likelihood of going to a 4-year college ("How likely is it that you will graduate from college (4-year program)?" 1 = definitely won't, 2 = probably won't, 3 = probably will, 4 = definitely will).

- *Evenings out per week* were assessed by how often students spend evenings out without parental supervision ("During a typical week, on how many evenings do you go out for fun and recreation? Don't count things you do with your parents or other adult relatives." 1 = less than one evening per week, 2 = 1 evening, 3 = 2 evenings, 4 = 3 evenings, 5 = 4-5 evenings, 6 = 6-7 evenings).

Statistical Analyses

Descriptive analyses were conducted to address the first three research questions—percentage of schools with drug-testing policies, student populations tested, and basis for testing. For the fourth research question regarding school characteristics and drug testing, logistic regressions were conducted to determine significant associations. Two models were examined: one model examined the bivariate relationship between drug testing and school characteristics; a second model assessed the multivariate relationships.

For the fifth research question, regarding the relationship between student drug use and school drug-testing policy, hierarchical generalized linear modeling (HGLM) was used for (a) 8^{th}, 10^{th}, 12^{th} grades separately, and high school students (10^{th} and 12^{th} grades combined), (b) high school male athletes, and (c) high school experienced marijuana users. For all three samples, three models were analyzed in a hierarchical manner. The first set of multilevel models involved examining the association of the school drug-testing policy with both the 7-category and binary outcome variables—in other words to look at differences in both prevalence and frequency of drug use. The second set of models controlled for student demographic characteristics—specifically, parental education, religiosity, truancy, grade point average, college plans, evenings out, student race, and gender. For the high school samples, we also included grade level as a student control. A third model controlled for the same student characteristics but also included school characteristics such as school sector, population density, number of students, SES, region, and school racial composition. For Models 1 through 3, all the variables are grand-mean centered. Because the results of the 7-category and binary outcomes are similar, only the results of the binary outcome variables will be reported. Specifically, HGLM analyses are conducted with a Bernoulli distribution log-link function, and the population average models with robust standard errors are reported (see Raudenbush & Bryk, 2002).

RESULTS

Drug Testing in Schools

Table 2 provides the descriptive statistics for drug testing from 1998 through 2002, revealing that drug testing was employed in a relatively small proportion of all *secondary schools*. Across the five years, 18.8% of schools in the study reported using drug testing of any kind; and they contained 19.4% of all students in the national samples. There was no significant linear upward trend from 1998 through 2002.

Table 3 provides the descriptive statistics for drug testing among *high schools* from 1998 through 2002. It shows that 23.6% of high schools (containing 24.4% of students in the school sample) employed drug testing.

Students and Drug Testing

Questions about types of students tested were not introduced until 1999. Among groups of students who were drug tested during 1999-2002, students who were suspected of using drugs were the most likely to be tested, with 13.8% of schools testing such students and 13.9% of students being in schools that tested for cause and suspicion. (See Table 2.) Drug testing *student athletes* occurred in only 5.3% of the schools (which had 6.1% of students in the school sample). Drug testing students in extracurricular activities *other* than athletics occurred in only 2.4% of the schools (containing 2.6% of students). There are no significant time trends observed across the four years for any of the groups of students drug tested.

Reasons for Drug Testing

Table 2 also shows that among the reasons for conducting drug tests during 1998-2002, the most common was for cause or suspicion. Across the five years, 14.3% of the schools, containing 14.7% of the students, tested due to cause or suspicion. The least common reason for drug testing was random testing applied to the entire student body, where only 0.8% of the schools, containing 0.7% of students, reported using random drug tests in which all students are eligible for drug testing. (Only seven such schools were identified as having this program across all five years combined.) The time trends for the reasons for drug testing—such as for-cause, routine, random for all students eligible, volunteer, and mandatory—are not significant.

Among high schools, the most common reason for drug testing students was for cause or suspicion, with 18.1% of high schools (containing 18.7% of high school students) doing so. See Table 3.

School Characteristics and Drug Testing

Table 4 shows the statistics for drug testing of any kind and the specific reasons for drug testing by school characteristics. A series of bivariate logistic regressions was conducted, with each school characteristic in turn predicting to whether or not the school did drug testing. Then a multivariate logistic regression was conducted, with all school characteristics predicting to drug testing.

For drug testing of any kind, the bivariate and multivariate logistic regression showed that significantly more high schools (23.5%) reported drug testing than did middle schools (7.6%).[1] Also, large schools reported somewhat more drug testing (22.0%) than small schools (14.3%).

Similarly, for-cause drug testing was more prevalent for high schools (18.1%) than for middle schools, and for large schools (17.8%) compared to smaller schools. For schools that conducted routine, volunteered, or mandated drug testing, more high schools reported drug testing than middle schools. Random drug testing did not differ significantly by any of the school characteristics.

Table 5 shows the statistics by school characteristics for drug testing specific student groups, such as athletes, participants in other extracurricular activities, students based on suspicion or cause ("for cause"), those on school probation, and volunteers. Overall, all groups were drug tested more in high schools than in middle schools. Interestingly for student athletes, schools in rural areas drug tested more athletes (10.5%) compared to schools in urban areas (1.2%).

Drug Testing and Student Marijuana Use

Turning to the key outcome variables of relevance, we present in Table 6 the prevalence, means, and standard deviations for student use of marijuana and other illicit drugs, by the presence or absence of school drug testing. Data are shown for 8th, 10th, and 12th graders separately for drug testing of any kind, and drug testing for cause and suspicion; in addition, the data are shown for high school students (10th and 12th grades only, combined) for drug testing of any kind, drug testing for cause and suspicion, and random drug testing. Note that within grade, all rates of marijuana use and other illicit drug use are extremely close for those students in schools that did and did not have drug testing. The largest absolute differences are observed for the small number of high schools that had random testing in which all students were eligible to be tested. Marijuana prevalence was 4.7 percentage points lower in the schools with such random testing; but the use of other illicit drugs was 3.3 percentage points higher. This is before any controls are introduced.

Any drug testing or testing for cause. Table 7 shows the HGLM results (population average models with robust standard errors) for predicting to drug use from school testing only (*Model 1*); school testing while controlling for student characteristics (*Model 2*); and school testing while controlling for student *and* school characteristics (*Model 3*). In the HGLM analyses for 8th, 10th, and 12th grade students separately, drug testing of any kind was not a significant predictor of student marijuana use in the past 12 months. Neither was drug testing for cause or suspicion, with one exception in Model 1 for 12th grade. There were no significant results in any of the samples after controlling for student characteristics (Model 2) or student and school demographic characteristics (Model 3). Among all high school students (10th and 12th grade students combined), the analyses showed no significant differences for drug testing of any kind and for for-cause testing.

[1] Note that for the purposes of these analyses, a school was categorized as a high school if it contained grades 10 and 12, even if it was the 8th grade that was surveyed at that school.

Random drug testing. Random drug testing, in which all students are subject to being tested, showed no significant association with marijuana use, even before controlling for student and school characteristics (see Table 7). The control for those characteristics actually reduced the level of association. To illustrate, Figure 1 shows the predicted probability of 12-month marijuana use among all the high school students in the sample. For ease of interpretation, we are using the HGLM results with the identity link function in the figures. In Model 1 (bivariate model), 34.2% of high school students in nondrug-testing schools reported using marijuana over the past 12 months, while 29.6% of high school students in schools that conduct random drug testing reported marijuana use. In Model 2 (controlling for student variables), 34.1% of high school students in nondrug-testing schools reported marijuana use, along with 32.3% of high school students in schools that conduct random drug tests. In Model 3 (controlling for student and school variables), 34.2% of high school students in nondrug-testing schools reported using marijuana, compared to 31.7% in schools that conduct random drug tests.

These differences in marijuana use by random drug testing are not significant at a $p < .05$ level or even at a $p < .10$ level. While the difference is in the predicted direction, a hypothesis that drug testing has deterrent effects could point to only small effects. The predicted prevalence of marijuana use among students in schools with drug testing is just 7% lower than the predicted prevalence for students without testing, after controlling for a large number of salient factors in Model 3 (31.7% vs. 34.2%). Controlling for just the student characteristics results in only a 5% difference. While the sample of seven schools and 500 students in them sets limits on the power to show significance, the estimated size of the effects are limited regardless of their significance. Further, as we shall see later, the difference moves in the opposite direction for use of the other illicit drugs.

Testing of athletes. The descriptive statistics (means and standard deviations) for male high school athletes' drug use, based on school drug-testing policies for athletes, are shown in Table 8. Only 212 male athletes are available for these analyses in the 18 schools reporting that they test athletes. Table 9 shows the HGLM results (population average models with robust standard errors) on drug testing athletes for Model 1 through Model 3. For male high school athletes, drug testing athletes was not a significant predictor of marijuana use among athletes. Figure 2 represents the HGLM models graphically (utilizing the models with the identity link function), where in Model 1 (bivariate model), the predicted probability of 12-month marijuana use for male athletes in nondrug-testing schools is 35.2%, as compared to 31.2% of male athletes in schools that conduct drug tests for athletes. In Model 2 (controlling for student characteristics), the predicted probability of marijuana use is 37.0% for male athletes in nondrug-testing schools, as compared to 32.3% marijuana use for male athletes in schools that drug test athletes. In Model 3 (controlling for student and school characteristics), the predicted probability of marijuana use is 36.5% for nondrug-testing schools, compared to 33.8% marijuana use for schools that drug test athletes. These relatively small differences in marijuana use by drug-tested athletes are not significant at a $p < .05$ level, or even at the $p < .10$ level.

Effects on heavy marijuana users. Table 10 shows the descriptive statistics (means and standard deviations) of drug use by experienced marijuana users in high school based on school drug-testing policies—specifically, drug testing of any kind, drug testing for cause and suspicion, and random drug testing. For high school marijuana users, the drug-testing policies were not a

significant predictor of marijuana use, as shown in Table 11. Figure 3 represents the predicted probability of 12-month marijuana use for experienced marijuana users in schools that conduct random drug testing and schools that do not. For Model 1, the bivariate model, the predicted probability of marijuana use among schools with no random drug testing was 94.4%, compared to 95.9% in schools with random drug testing. For Model 2, controlling for student characteristics, the predicted probability of marijuana use was 94.7% for schools with no random drug testing, compared to 95.0% in schools with random drug testing. In Model 3, controlling for student and school characteristics, the predicted probability of marijuana use in schools with no random drug testing was 94.9%, compared to 94.0% in schools with random drug testing. (It should be noted that these findings are based on only 77 heavy marijuana-using students in the seven schools that report random testing in which all students are eligible for testing.)

Drug Testing and Other Illicit Drug Use

Any drug testing and testing for cause. Similar to the results for marijuana use, drug testing of any kind and drug testing for cause and suspicion were not significant predictors for the use of other illicit drugs among 8th, 10th, and 12th graders, or high school students. This was true without any controls (Model 1) and with the full set of controls (Model 3) (see Table 7).

Random drug testing. Similarly, random drug testing, in which all students are subject to being tested, did not show a significant difference in reported illicit drug use associated with testing either without controls or with the full set. Figure 4 shows the predicted probability of 12-month illicit drug use (other than marijuana) among all the high school students in the sample for schools that do and do not have random testing. This is the type of testing that shows the largest absolute between-group differences, and as noted earlier, in this case the differences run in the direction of the drug-testing schools having *higher* rates of use. In Model 1, 16.7% of high school students in schools with no random drug testing reported using illicit drugs, while 20.8% of high school students in schools with random drug testing reported using illicit drugs. In Model 2, controlling just for student characteristics, 22.8% of students in schools with random drug testing reported using illicit drugs vs. 16.6% in other schools (a statistically significant difference); and in Model 3, 19.8% of students in schools with random drug testing reported using illicit drugs vs. 16.6% in other schools (not significantly different).

Testing of athletes. The prevalence of use of illicit drugs other than marijuana among male high school athletes was not significantly different based on drug testing of athletes in the school. Even after controlling for student and school demographic characteristics, drug testing of athletes was not a significant predictor for other illicit drug use by athletes. As with random testing, students subject to testing as athletes actually had a slightly higher prevalence of use of the illicit drugs other than marijuana, but not a statistically significant one.

Effects on heavy users. It may be safely assumed that heavy marijuana users (here defined as having used marijuana on 20 or more occasions in their lifetime) are on average heavy users of other illegal drugs; and the data provided in Table 10 confirm that fact. Over half of them (approximately 53%) indicate having used an illicit drug *other* than marijuana in just the prior 12 months—a rate far above the roughly 17% shown in Table 6 for all high school students. However, there is no evidence that drug testing of any kind—based on cause or suspicion, or random—reduced the use of illicit drugs other than marijuana in this population of heavy users.

Those exposed and unexposed to drug testing have virtually identical prevalence and frequency rates (Table 10), even before controls; and nothing becomes significant with controls (Table 11).

CONCLUSION

One major contribution of this occasional paper, beyond what was presented in our earlier paper (Yamaguchi, Johnston, & O'Malley, 2003), is an increased sample of schools--an additional 209 schools from the 2002 MTF national survey. The results presented here show that the earlier results replicate with this enhanced sample. There are still no significant differences in marijuana use or the use of other illicit drugs as a function of whether or not the school has (a) drug testing of any kind, (b) drug testing of students based on cause or suspicion, or (c) drug testing of athletes. Nor is there evidence that the heavy drug-using segment of the student population, specifically, is deterred from using marijuana or other illicit drugs by random or for-cause testing.

Another contribution of this paper is an extended the time period over which trend data are available, with the purpose of evaluating whether school policies in this area are changing. In general, school policies seem to have been stable between 1998 and 2002. The 2003 decision of the Supreme Court, however, along with a recent initiative of the White House Office of National Drug Control Policy to promote the use of drug testing in schools, may give rise to more widespread application of school drug testing in the future.

The third, and most important, incremental contribution of this paper is an analysis of schools that have implemented a policy of random testing in which *all* students in the school are eligible to be tested. Logic would suggest that this form of testing might be most likely to reduce the drug rates for the student body at large, as critics of our earlier paper have pointed out. With some effort, and somewhat to our surprise, we were able to identify seven schools in our combined five-year sample of nearly 900 schools that had implemented such a policy.[2] While fewer than we might like to have for analysis purposes, this number is probably more than any other study has obtained, particularly as a result of random selection from the population. Thus it is about as representative a sample of schools actually practicing random testing as one is likely to find. Clearly, the sample size puts limitations on the power of the analyses—in other words, it is more difficult to show a given difference in outcome to be statistically significant than if the sample of schools were larger. But the absolute nature of the differences that we observed could not argue in favor of the efficacy of random drug testing students in schools. Even if we took the observed values to be true, they would suggest only a 5% to 7% reduction in the prevalence of marijuana use associated with testing and, disturbingly, a larger proportional *increase* in the use of other drugs, after controlling for the kinds of students and schools involved. One could generate hypotheses to explain such a phenomenon, such as that testing leads students to reduce their use of drugs that can be detected (like marijuana) and to displace their use onto drugs that they think less likely to be detected. While this is not an unreasonable hypothesis, we do not believe that enough data exist to provide an adequate test of it.

[2] Our surprise derived from the fact that the constitutionally of such broad testing of students was very much open to question prior to the 2003 Supreme Court decision.

So, does drug testing prevent or inhibit student drug use? Our data suggest that, as practiced in recent years in American secondary schools, it does not. That is different from saying that it could not under any circumstances. The two forms of drug testing that are generally assumed to be most promising for reducing student drug use—random testing applied to all students (and, therefore, also likely applied to those in any extracurricular activities, which may come close to encompassing all students), and testing of athletes—did not produce encouraging results.

There are, of course, limitations to the present study. It does not use a pre-post design, nor does it have random assignment to treatment conditions—both desiderata for an ideal evaluation of an intervention program. On the other hand, we are able to control for a number of the strongest correlates of drug use at the student and school levels, and these controls should remove many effects of prior differences that may have existed between the two treatment groups (tested and not tested). Another limitation of the study is that we do not have detailed information about the nature of these programs, because drug testing was not the primary focus of either research project (MTF or YES). Drug testing is but one of a range of school policies and programs dealing with substance use in the student body that was addressed in the YES questionnaire. This lack of data makes it impossible to control for the degree or duration of drug testing implementation in the schools.

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TABLES

Table 1. National Samples and Response Rates

Response	1998	1999	2000	2001	2002	Total
School Administrators						
Targeted sample	222	207	226	221	209	1085
Number responding	196	174	171	183	170	894
Response rate	88.3%	84.1%	75.7%	82.8%	81.3%	82.4%
8th grade sample	72	62	64	64	61	323
8th grade response rate	91.1%	88.6%	82.1%	82.1%	81.3%	85.0%
10th grade sample	62	53	52	60	55	282
10th grade response rate	91.2%	80.3%	69.3%	84.5%	82.1%	81.3%
12th grade sample	62	59	55	59	54	289
12th grade response rate	82.7%	83.1%	75.3%	81.9%	80.6%	80.7%
Students						
Student sample	21,073	19,176	18,005	17,299	18,945	94,498
Student response rate	87.0%	86.9%	88.6%	87.2%	87.9%	87.5%
8th grade student sample	7,425	7,691	6,894	6,329	7,174	35,513
8th grade student response rate	89.5%	88.4%	90.7%	89.6%	91.4%	89.9%
10th grade student sample	8,170	6,201	5,632	5,621	6,217	31,841
10th grade student response rate	87.4%	86.7%	88.8%	87.5%	86.8%	87.4%
12th grade student sample	5,478	5,284	5,479	5,349	5,554	27,144
12th grade student response rate	83.1%	84.8%	85.7%	84.0%	84.5%	84.4%

Note: Weights were used to provide nationally representative estimates for student data.

Table 2. Prevalence of Drug Testing of Various Types in American Secondary Schools

	1998	1999	2000	2001	2002	Total
N schools	*195*	*174*	*171*	*182*	*169*	*891*
Drug testing of any kind						
% Schools	14.4	19.5	23.4	15.9	20.7	18.8
% Students	16.2	21.1	24.0	15.6	20.1	19.4
Drug testing certain groups of students						
N schools	--	*174*	*171*	*182*	*169*	*696*
Student athletes						
% Schools	--	2.9	7.0	5.0	6.5	5.3
% Students	--	4.6	7.4	5.7	6.9	6.1
Other extracurriculars						
% Schools	--	0.6	2.9	3.3	3.0	2.4
% Students	--	1.6	3.1	2.8	2.9	2.6
Cause/suspicion						
% Schools	--	14.4	15.8	12.1	13.0	13.8
% Students	--	15.2	15.7	11.2	13.4	13.9
School probation						
% Schools	--	4.0	4.1	2.8	1.2	3.0
% Students	--	3.4	3.4	1.4	1.1	2.3
Volunteered						
% Schools	--	4.6	3.5	3.3	3.0	3.6
% Students	--	5.7	3.9	3.0	2.5	3.8

continued

Table 2, cont.

		1998	1999	2000	2001	2002	Total
Bases for drug testing							
N schools		*195*	*174*	*170*	*182*	*169*	*890*
Cause/suspicion							
	% Schools	9.7	15.5	18.8	13.2	14.2	14.3
	% Students	10.6	17.0	18.7	12.9	14.3	14.7
Routine							
	% Schools	2.6	3.4	6.5	4.4	3.6	4.1
	% Students	3.3	3.4	5.5	4.1	4.2	4.1
Random for all students[a]							
	% Schools	0	1.7	1.2	0	1.2	0.8
	% Students	0	1.0	1.3	0	1.1	0.7
Volunteer							
	% Schools	5.1	5.8	6.5	7.7	7.1	6.4
	% Students	6.0	6.5	5.9	6.3	6.6	6.3
Mandated							
	% Schools	5.6	2.3	5.9	5.5	4.1	4.7
	% Students	5.2	2.0	4.6	5.3	3.3	4.1

Notes: '--' denotes data not available.
Percentages are based on total sample for each year.
Weights were used to provide nationally representative estimates for student data.
[a] Random testing applied with all students eligible for drug testing. This is a subset of those reporting "routine" or "mandated" drug testing, identified by means of a follow-up phone call in 2003 to all schools in those two categories. A total of seven such schools were identified across the five years.

Table 3. Prevalence of Drug Testing of Various Types in *High Schools Only*[a]

	1998	1999	2000	2001	2002	Total
N schools	*131*	*119*	*119*	*128*	*119*	*616*
Drug testing of any kind						
% Schools	19.8	21.8	28.6	21.1	26.9	23.6
% Students	22.1	22.2	29.0	22.1	26.7	24.4
Drug testing certain groups of students						
N Schools	--	*119*	*119*	*128*	*119*	*485*
Student athletes						
% Schools	--	3.4	9.2	7.0	7.6	6.8
% Students	--	5.9	10.0	8.5	7.7	8.0
Other extracurriculars						
% Schools	--	0.8	4.2	4.7	4.2	3.5
% Students	--	2.5	4.5	4.2	4.2	3.9
Cause/suspicion						
% Schools	--	16.8	19.3	15.6	17.6	17.3
% Students	--	17.5	18.7	15.5	18.7	17.6
School probation						
% Schools	--	5.9	5.0	3.9	0.8	3.9
% Students	--	5.3	3.8	2.0	1.0	3.0
Volunteered						
% Schools	--	5.9	5.0	4.7	4.2	4.9
% Students	--	6.9	5.7	4.5	3.7	5.2

continued

Table 3, cont.

	1998	1999	2000	2001	2002	Total
Bases for drug testing						
N schools	*131*	*119*	*118*	*128*	*119*	*615*
Cause/suspicion						
% Schools	13.0	17.6	23.7	17.2	19.3	18.1
% Students	13.7	18.5	23.1	18.1	20.0	18.7
Routine						
% Schools	3.8	4.2	7.6	6.3	4.2	5.2
% Students	4.9	4.0	6.2	6.1	4.9	5.2
Random for all students[b]						
% Schools	0	2.5	1.7	0	1.7	1.1
% Students	0	1.5	1.9	0	1.6	1.0
Volunteer						
% Schools	6.9	5.9	8.5	10.2	9.2	8.1
% Students	7.9	6.4	7.8	8.9	9.2	8.0
Mandated						
% Schools	7.6	3.4	6.8	7.8	5.0	6.1
% Students	6.8	3.1	4.8	7.9	3.8	5.3

Notes: '--' denotes data not available.
Percentages are based on total sample for each year.
Weights were used to provide nationally representative estimates for student data.

[a] Middle schools are omitted. A school is categorized as a high school if it contained grades 10 and 12, regardless of what grade participated in the student survey.
[b] Random testing applied with all students eligible for drug testing. This is a subset of those reporting "routine" or "mandated" drug testing, identified by means of a follow-up phone call in 2003 to all schools in those two categories. A total of seven schools were identified across the five years.

Table 4. Reasons for Drug Testing by School Characteristics: 1998-2002 Combined

		Reasons for Drug Testing					
	N	**% Any Kind**	**% For-Cause**	**% Routine**	**% Random[a]**	**% Volunteered**	**% Mandated**
Total	*891*	18.6	14.1	4.0	0.8	6.4	4.7
Number of schools testing		*166*	*126*	*36*	*7*	*57*	*42*
School level							
Middle[b]	*275*	7.6[c]	5.5	1.5	0.0	2.6	1.5
High	*616*	23.5 $^{+++}_{***}$	18.1 $^{+++}_{***}$	5.2 $^{+}_{*}$	1.1	8.1 $^{++}_{**}$	6.2 $^{++}_{**}$
Sector							
Public[b]	*753*	18.7	13.8	4.3	0.5	6.5	4.7
Private	*138*	18.1	15.9	2.9	2.2	5.8	5.1
Population density							
Large MSA[b]	*221*	15.4	13.1	2.7	0.5	6.3	2.3
Other MSA	*478*	20.3	15.3	4.0	0.6	6.9	5.2
Non-MSA	*192*	18.2	12.6	5.8	1.6	5.2	6.3 $^{+}$
School SES							
Low SES[b]	*313*	20.1	14.4	5.5	1.0	8.3	4.8
Mid-SES	*309*	14.2 $^{+}$	10.0	3.2	0.3	4.2 $^{+}_{*}$	4.2
High SES	*269*	21.9	18.6	3.4	1.1	6.7 $_{*}$	5.2

continued

Table 4, cont.

	N	% Any Kind	% For-Cause	% Routine	% Random[a]	% Volunteered	% Mandated
School size							
Smallest third[b]	*272*	14.3	10.3	3.7	1.1	5.9	5.5
Middle third	*333*	19.2	14.1	4.5	1.2	6.3	5.1
Largest third	*286*	22.0 $^{+}_{**}$	17.8 $^{+}_{**}$	3.9	0.0	7.0	3.5
Majority race/ethnicity							
Majority White[b]	*574*	19.9	15.0	4.2	1.1	7.0	5.4
Majority Black	*80*	15.0	12.5	6.3	1.3	3.8	3.8
Majority Hispanic	*67*	17.9	14.9	1.5	0.0	4.5 $_{*}$	3.0
Other	*170*	16.5	11.8	3.5	0.0	6.5	3.5
Region							
Northeast[b]	*211*	19.0	16.1	1.9	0.5	8.5	3.8
North Central	*240*	15.8	13.3	4.2	0.8	4.2	2.5
South	*276*	19.2	12.0	6.9 $^{+}$	1.5	5.5	6.6
West	*164*	21.3	16.5	1.8	0.0	8.5	6.1

Notes: One school is missing data on reasons for drug testing across 1998-2002.

[a] Random testing applied with all students eligible for drug testing. This is a subset of those reporting "routine drug testing," identified by a follow-up phone call for all schools in the category.

[b] Referent group.

[c] 7.6% of 275 middle schools equals 21 middle schools that conduct drug testing of any kind.

$^{+}$ Bivariate logistic regression $p < .05$

$^{++}$ Bivariate logistic regression $p < .01$

$^{+++}$ Bivariate logistic regression $p < .001$

* Multivariate logistic regression $p < .05$

** Multivariate logistic regression $p < .01$

*** Multivariate logistic regression $p < .001$

Table 5. Student Groups Tested by School Characteristics: 1999-2002 Combined

	N	Drug Testing Student Groups				
		% Athletes	**% in Extracurricular Activities**	**% For-Cause**	**% on School Probation**	**% Volunteers**
Total	*696*	5.3	2.4	13.8	3.0	3.6
Number of schools testing		*37*	*17*	*96*	*21*	*25*
School level						
Middle[a]	*211*	1.9[b]	0	5.7	1.0	0.5
High	*485*	6.8 $^{+}_{*}$	3.5	17.3 $^{+++}_{***}$	3.9 $_{*}$	5.0 $^{+}_{*}$
Sector						
Public[a]	*588*	6.3	2.9	13.3	2.9	3.9
Private	*108*	0	0	16.7	3.7	1.9
Population density						
Large MSA[a]	*164*	1.2	0.6	11.0	3.1	3.1
Other MSA	*380*	5.0	2.1	15.3	3.2	3.7
Non-MSA	*152*	10.5 $^{++}_{*}$	5.3 $^{+}$	13.2	2.6	4.0
School SES						
Low SES[a]	*239*	8.0	5.4	12.6	3.4	4.2
Mid SES	*256*	4.3	0.8 $^{++}_{**}$	10.6	2.3	2.0
High SES	*201*	3.5	1.0 $^{+}$	19.4	3.5	5.0

continued

Table 5, cont.

	N	% Athletes	% in Extracurricular Activities	% For-Cause	% on School Probation	% Volunteers
School size						
Smallest third [a]	*213*	5.6	3.3	10.3	3.3	3.3
Middle third	*263*	4.2	2.3	13.3	3.4	3.4
Largest third	*220*	6.4	1.8	17.7 $^{+}_{**}$	2.3	4.1
Majority race/ethnicity						
66%+ White[a]	*455*	5.3	2.2	14.5	3.7	4.8
Majority Black	*64*	4.7	1.6	12.5	3.1	1.6
Majority Hispanic	*49*	6.1	4.1	14.3	2.0	0
Other	*128*	5.5	3.1	11.7	0.8	1.6
Region						
Northeast[a]	*169*	1.8	1.2	16.6	5.3	5.3
North Central	*186*	5.9	1.1	13.4	1.6 $_{*}$	3.2
South	*214*	8.4 $^{+}$	4.7	11.2	2.3	3.3
West	*127*	3.9	2.4	15.0	3.2	2.4

Notes: [a] Referent group.
[b] 1.9% of 211 middle schools equals 4 middle schools that drug test student athletes.
$^{+}$ Bivariate logistic regression $p < .05$
$^{++}$ Bivariate logistic regression $p < .01$
$^{+++}$ Bivariate logistic regression $p < .001$
* Multivariate logistic regression $p < .05$
** Multivariate logistic regression $p < .01$
*** Multivariate logistic regression $p < .001$

Table 6. Prevalence, Means, and Standard Deviations of Student Drug Use by Drug Testing: 1998-2002, Combined

			12-Month Marijuana Prevalence			12-Month Illicit Drug Prevalence (Other Than Marijuana)		
			Percent	Frequency[a]		Percent	Frequency[a]	
	N Schools	*N Students*[b]		Mean	SD		Mean	SD
8th grade								
Drug testing of any kind								
No	*290*	*31,500*	15.4	1.41	1.16	9.6	1.05	0.22
Yes	*29*	*3,900*	14.4	1.39	1.11	10.3	1.05	0.26
Drug testing based on cause/suspicion								
No	*300*	*32,500*	15.5	1.41	1.16	9.7	1.05	0.23
Yes	*19*	*2,900*	13.5	1.36	1.02	9.3	1.04	0.22
10th grade								
Drug testing of any kind								
No	*209*	*21,400*	31.3	2.01	1.82	16.5	1.10	0.35
Yes	*70*	*7,700*	32.1	1.99	1.81	16.4	1.10	0.35
Drug testing based on cause/suspicion								
No	*223*	*22,900*	31.6	2.01	1.83	16.8	1.10	0.35
Yes	*56*	*6,200*	31.1	1.96	1.77	15.5	1.09	0.32

continued

Table 6, cont.

	N Schools	*N Students* [b]	12-Month Marijuana Prevalence			12-Month Illicit Drug Prevalence		
			Percent	Frequency[a]		Percent	Frequency[a]	
				Mean	SD		Mean	SD
12th grade								
Drug testing of any kind								
No	*220*	*21,900*	36.5	2.20	1.95	17.1	1.13	0.42
Yes	*66*	*6,500*	37.4	2.27	1.99	18.7	1.14	0.43
Drug testing based on cause/suspicion								
No	*235*	*23,300*	36.2	2.19	1.96	17.2	1.13	0.42
Yes	*51*	*5,100*	39.0	2.34	1.99	18.6	1.14	0.44
High schools (10th and 12th grades combined)								
Drug testing of any kind								
No	*429*	*43,300*	33.9	2.11	1.89	16.8	1.11	0.39
Yes	*136*	*14,200*	34.4	2.12	1.90	17.4	1.12	0.39
Drug testing based on cause/suspicion								
No	*458*	*46,200*	33.9	2.10	1.90	17.0	1.11	0.39
Yes	*107*	*11,300*	34.5	2.13	1.88	16.9	1.11	0.38
Random drug testing[c]								
No	*558*	*57,000*	34.1	2.11	1.89	16.9	1.11	0.39
Yes	*7*	*500*	29.4	1.86	1.77	20.2	1.12	0.37

Notes: [a] 1-7 scale ranging from "0 occasions" to "20+ occasions."
[b] Approximate N to the nearest 100 for student data.
[c] Random testing applied for all students eligible for drug testing. This is a subset of those reporting "routine drug testing," identified by a follow-up phone call for all schools in the category.
Weights were used to provide nationally representative estimates for student data.

Table 7. Multilevel Analyses Results for School Drug Testing Predicting to Student Drug Use

	12-Month Marijuana Prevalence						12-Month Illicit Drug Prevalence (Other Than Marijuana)					
	Model 1[a]		Model 2[b]		Model 3[c]		Model 1[a]		Model 2[b]		Model 3[c]	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
8th grade												
Drug testing of any kind	-0.04	0.11	-0.07	0.12	-0.08	0.11	0.04	0.11	0.09	0.13	0.16	0.13
For-cause drug testing	-0.15	0.14	-0.21	0.17	-0.19	0.15	-0.04	0.13	-0.09	0.15	0.06	0.15
10th grade												
Drug testing of any kind	0.06	0.06	0.09	0.07	0.05	0.07	-0.01	0.07	0.04	0.08	-0.04	0.07
For-cause drug testing	-0.02	0.07	0.07	0.07	0.07	0.07	-0.11	0.08	0.02	0.09	-0.01	0.07
12th grade												
Drug testing of any kind	0.07	0.07	0.05	0.08	0.06	0.07	0.13	0.07	0.05	0.08	0.05	0.08
For-cause drug testing	0.16*	0.08	0.07	0.08	0.09	0.08	0.11	0.08	-0.03	0.09	-0.02	0.09
High school												
Drug testing of any kind	0.06	0.05	0.07	0.05	0.04	0.05	0.06	0.05	0.05	0.06	0.02	0.05
For-cause drug testing	0.06	0.05	0.07	0.06	0.05	0.05	0.00	0.06	0.00	0.06	-0.01	0.06
Random drug testing	-0.21	0.21	-0.11	0.22	-0.14	0.21	0.28	0.21	0.47**	0.17	0.27	0.18

Notes: The results are from the population average models with robust standard errors.

[a] Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.

[b] Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.

[c] Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

Table 8. High School (10th and 12th Grade, Combined) Male Student Athletes' Drug Use by Presence of Drug Testing for Athletes: 1999-2002, Combined[a]

			12-Month Marijuana Prevalence			12-Month Illicit Drug Prevalence (Other Than Marijuana)		
			Percent	Frequency[b]		Percent	Frequency[b]	
	N Schools	*N Students*[c]		Mean	SD		Mean	SD
No	*279*	*3800*	36.9	2.22	2.01	15.9	1.12	0.42
Yes	*18*	*212*	32.1	2.04	2.28	17.1	1.09	0.42

Notes: [a] Athletes are defined as students who reported participating to a great extent in school athletic teams.
[b] 1-7 scale ranging from "0 occasions" to "20+ occasions."
[c] Approximate N to the nearest 100 for student data.
Weights were used to provide nationally representative estimates for student data.

Table 9. Multilevel Analyses Results for Athlete Drug Testing Predicting to Male Athletes' Drug Use

	12-Month Marijuana Prevalence						12-Month Illicit Drug Prevalence (Other Than Marijuana)					
	Model 1[a]		Model 2[b]		Model 3[c]		Model 1[a]		Model 2[b]		Model 3[c]	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
High school athletes												
Drug test athletes	-0.18	0.27	-0.23	0.25	-0.15	0.24	0.06	0.24	0.16	0.27	0.23	0.25

Notes: The population average models with robust standard errors are reported.
Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.
Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.
Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

Table 10. Drug Use by Experienced High School Marijuana Users[a] by Presence of Drug Testing: 1998-2002, Combined

			12-Month Marijuana Prevalence			12-Month Illicit Drug Prevalence (Other Than Marijuana)		
			Percent	Frequency[b]		Percent	Frequency[b]	
	N Schools	*N Students*[c]		Mean	SD		Mean	SD
High schools (10th and 12th combined)								
Drug testing of any kind								
No	*423*	*7,900*	94.4	5.45	1.78	53.4	1.46	0.74
Yes	*134*	*3,500*	94.2	5.43	1.85	52.5	1.45	0.73
Drug testing based on cause/suspicion								
No	*451*	*8,400*	94.3	5.44	1.80	53.6	1.46	0.75
Yes	*106*	*2,000*	94.3	5.46	1.76	51.2	1.44	0.71
Random drug testing								
No	*550*	*10,300*	94.3	5.45	1.80	53.2	1.46	0.74
Yes	*7*	*77*	96.2	5.44	1.64	53.8	1.46	0.71

Notes: [a] Experienced marijuana users are defined as students who reported using marijuana on 20 or more occasions in their lifetime.
[b] 1-7 scale ranging from "0 occasions" to "20+ occasions."
[c] Approximate N to the nearest 100 for student data.
Weights were used to provide nationally representative estimates for student data.

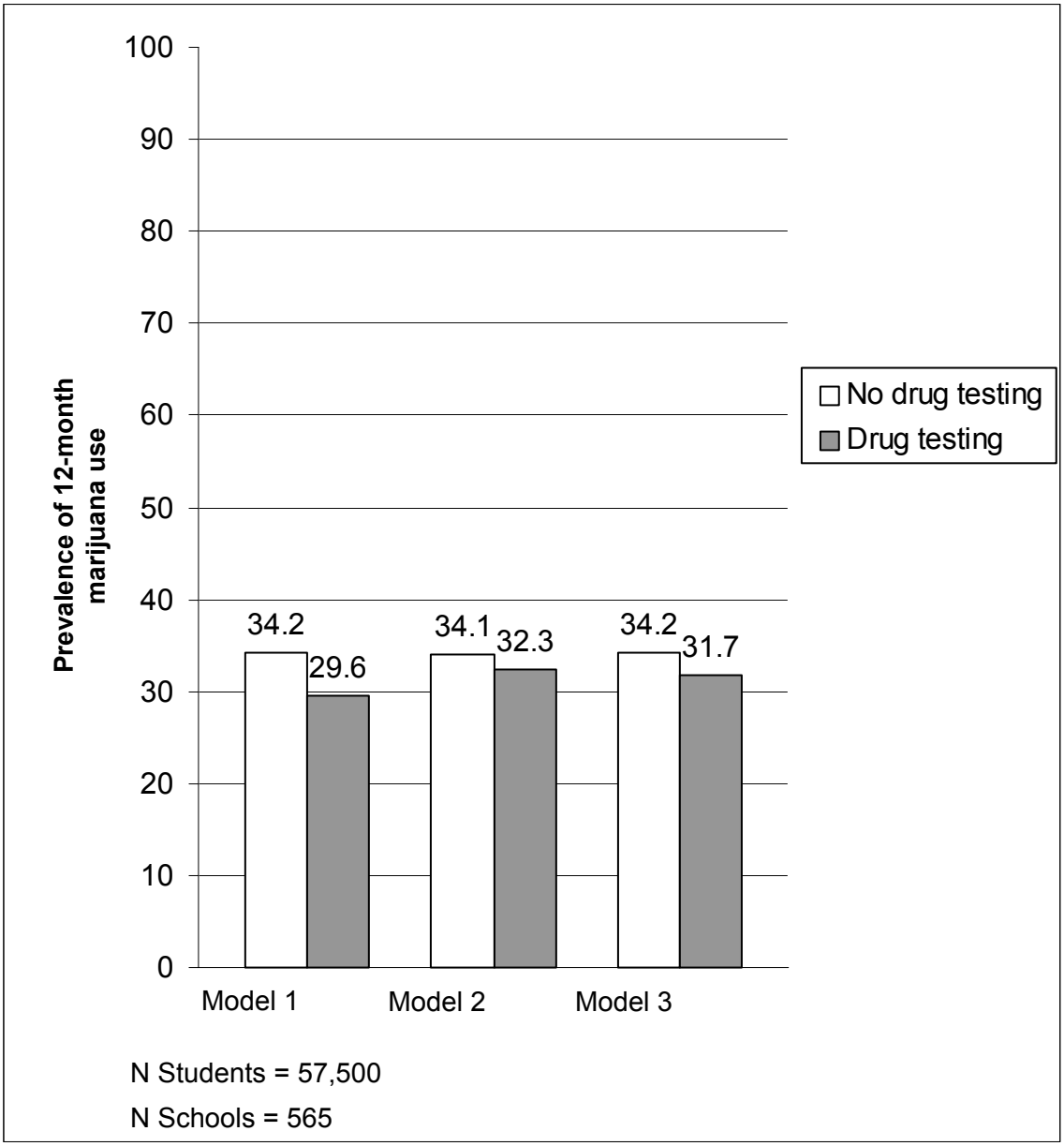
Table 11. Multilevel Analyses Results for Drug Testing Predicting to Experienced Marijuana Users

	12-Month Marijuana Use						12-Month Illicit Drug Use (Other Than Marijuana)					
	Model 1[a]		Model 2[b]		Model 3[c]		Model 1[a]		Model 2[b]		Model 3[c]	
	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.	B	s.e.
High school users												
Drug testing of any kind	-0.05	0.11	-0.11	0.13	-0.13	0.13	0.00	0.08	-0.07	0.08	-0.09	0.08
For-cause drug testing	0.00	0.12	-0.16	0.15	-0.18	0.15	-0.09	0.08	-0.14	0.09	-0.13	0.08
Random drug testing	0.35	0.57	0.06	0.55	-0.05	0.59	0.14	0.34	0.08	0.30	-0.25	0.29

Notes: The population average models with robust standard errors are reported.
Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.
Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.
Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

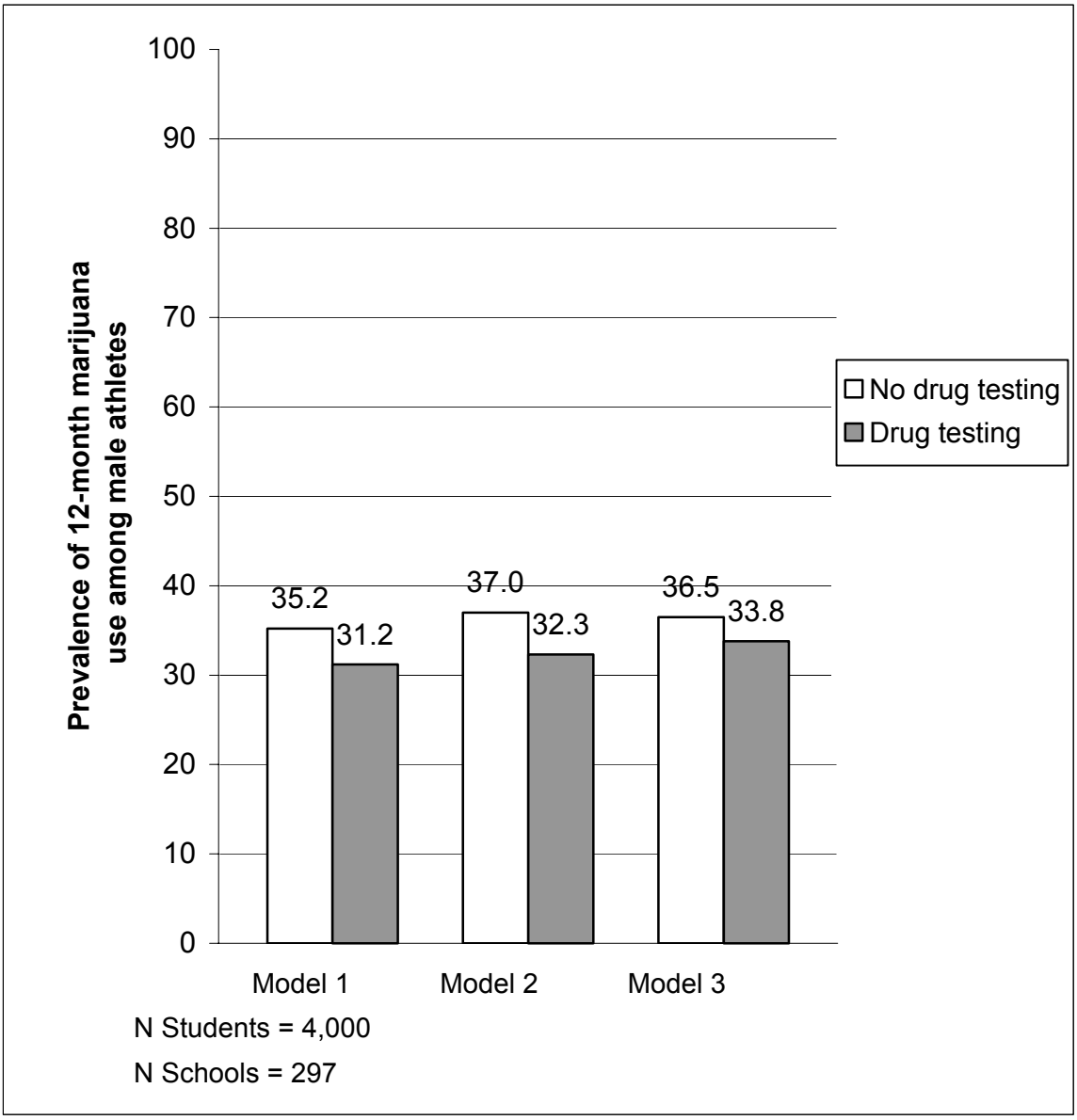
FIGURES

Figure 1. Estimated Prevalence of Marijuana Use Among High School Students by Random Drug Tests



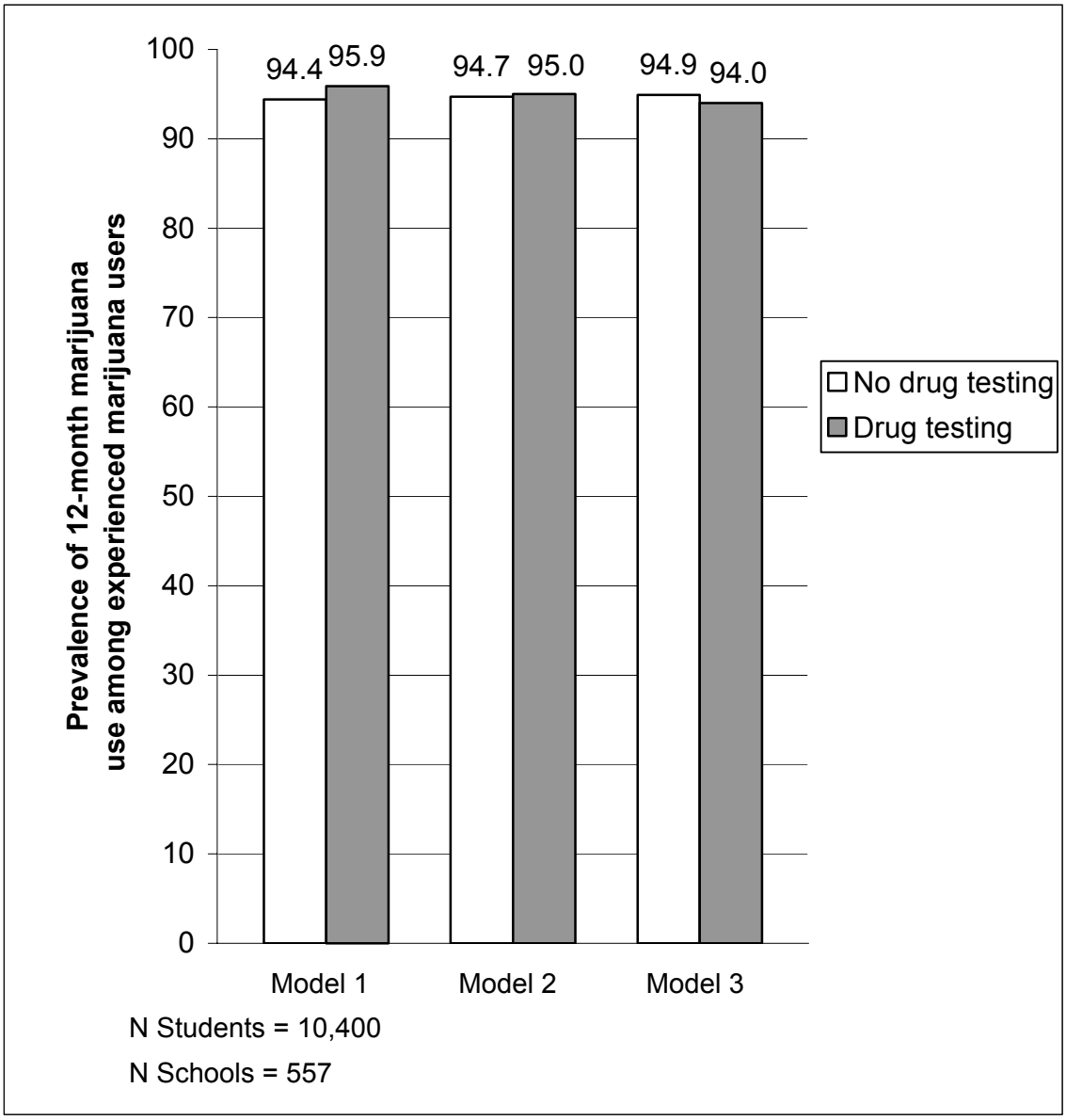
Notes: The predicted probabilities are from the identity-link function.
Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.
Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.
Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

Figure 2. Estimated Prevalence of Marijuana Use Among High School Male Athletes by Drug Tests for Athletes



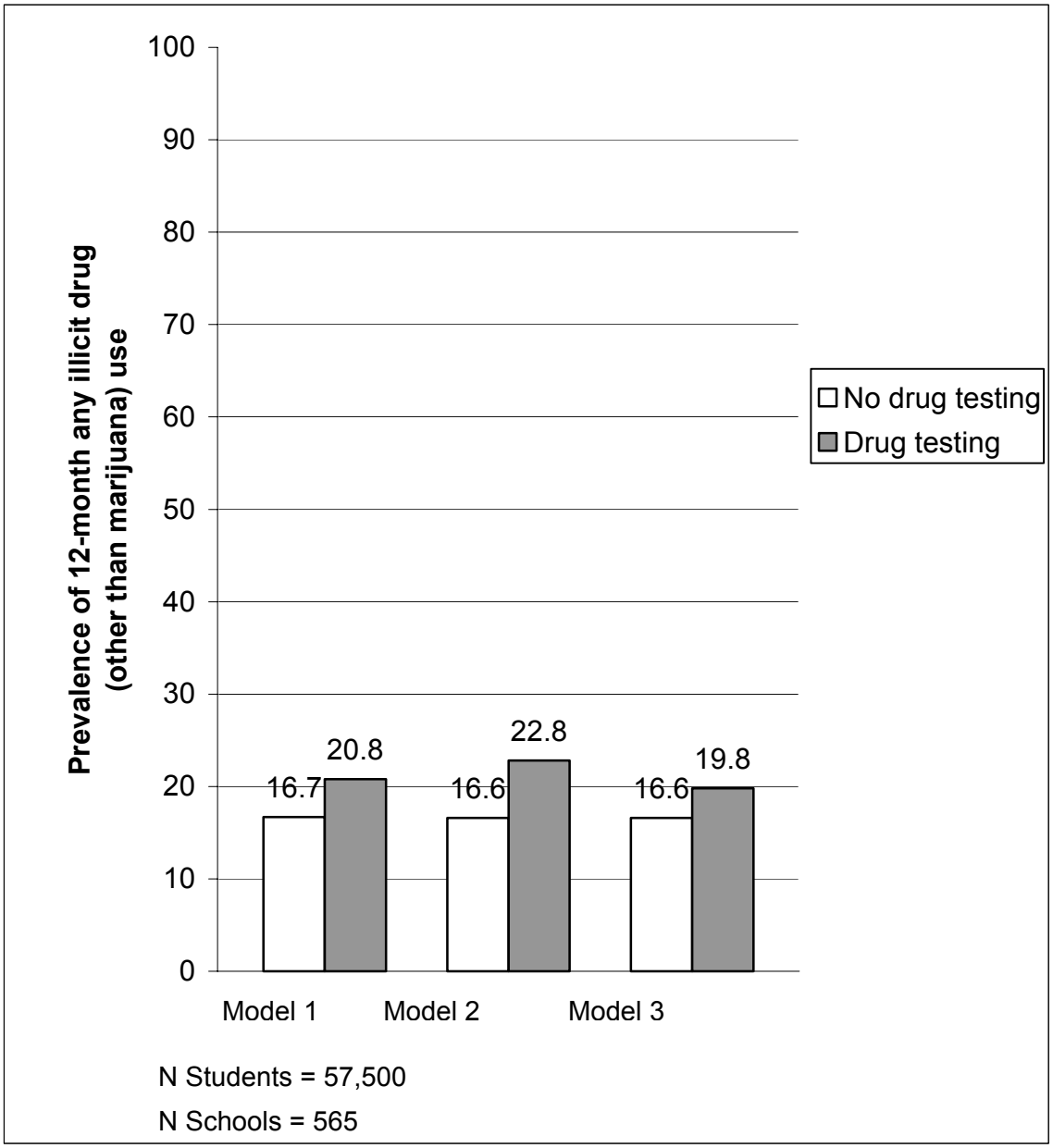
Notes: The predicted probabilities are from the identity-link function.
Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.
Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.
Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

Figure 3. Estimated Prevalence of Marijuana Use Among High School Experienced Marijuana Users by Random Drug Tests



Notes: The predicted probabilities are from the identity-link function.
Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.
Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.
Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

Figure 4. Estimated Prevalence of Illicit Drug Use (Other than Marijuana) Among High School Students by Random Drug Tests



Notes: The predicted probabilities are from the identity-link function.
Model 1 indicates a bivariate hierarchical generalized linear model (HGLM), grand-mean centering drug testing at the school level.
Model 2 indicates a multivariate HGLM, grand-mean centering the following student-level control variables: grade level, gender, race, grade point average, going out, religiosity, truancy, college-bound, and parental education.
Model 3 indicates a multivariate HGLM, grand-mean centering the same student-level control variables used in Model 2 and school-level control variables: private/public sector, school size, school SES, region, and majority race composition.

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