

A Science Education Curriculum to Curb Youth Drug Use: Implications for Practice and Public Policy

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The use of illicit drugs, including alcohol, tobacco, and other substances, among children and youth is a considerable public health and public policy issue, not only because of alarming rates of usage, but also because of the deleterious effects that illicit drugs can have on individual users and their communities. Research on usage, for example, suggests that roughly two in five eighth graders nationally have used alcohol, while one in five have used an illicit drug (Johnston et al., 2006). What is more, youth who use illicit drugs have a higher risk for negative outcomes than those who refrain from illicit drug use. These outcomes, including poor academic performance and higher school drop-out rates (Windle & Wiesner, 2004), perpetration of violence (U.S. DHHS, 2001), and later substance abuse and dependence (Gil et al., 2004), create considerable economic and social consequences, including treatment costs and lost economic productivity.

Substance abuse among youth and teens is not confined to alcohol, tobacco, and illegal street drugs. Prescription drug abuse is also a significant public health problem. In fact, prescription drugs are the most commonly abused drug among 12 and 13-year-olds (National Survey on Drug Use and Health, 2006). Policymakers have taken notice of this public health problem. Not only is there legislation pending in Congress that includes language on the issue of substance abuse among children and teens, but the House and Senate also passed resolutions marking August 2007 as National Medicine Abuse Awareness Month.

Evidence pointing to drug use among youth as a significant public health problem has generated a crucial need to develop effective interventions. This brief reports on one such intervention, namely, a science-based educational approach funded by the National Institute on Drug Abuse. The approach, administered in classrooms to middle school students, is predicated on changing the knowledge of youth about the effects of

RESEARCH OBJECTIVES

Science education offers a unique opportunity to infuse persuasive health information into core curricula in a crowded school environment. This brief presents the results of an evaluation of a multimedia science education curriculum on drugs of abuse developed with funding from the National Institute on Drug Abuse. Students exposed to the curriculum showed increases in knowledge, providing tentative support for the effectiveness of this approach.

drugs and alcohol on the brain and body, which then can translate into protective attitudes and behaviors about the use of illicit drugs. This three-step process of knowledge, attitude, and behavior change has its theoretical roots in the Theory of Reasoned Action (Ajzen & Fishbein, 1980). This brief specifically reports on the findings of a study of the effectiveness of the first step in this process, namely, the use of a science-based educational curriculum to change the knowledge of youth about the negative physiological impact of drugs and alcohol.

Curriculum

The curriculum provides students in grades six through eight with multimedia lessons on how drugs and alcohol change the brain and body. The curriculum contains six, 45-minute lessons, and each lesson includes interactive activities, quizzes, animated tutorials, and games. The sessions work sequentially and build on one another so that introductory lessons about the brain serve as a foundation for later lessons on the physiological effects of drugs and alcohol.

The curriculum was designed as a science-based educational tool to be implemented in classroom settings. This design element relates in large measure to

the policy push toward standards of learning in K-12 education. Indeed, the implementation of No Child Left Behind and other state policy initiatives has created the need to develop curricula that can be used in conjunction with standardized educational lesson plans. To that end, the curriculum was predicated not only on National Science Education Standards, but also standards of learning from several states, including New York, California, and North Carolina.

Methodology

To evaluate the curriculum as a tool to change knowledge about the effects of illicit drugs on the brain and body, we designed a quasi-experimental pre-test/post-test approach that was implemented in eight charter schools in North Carolina, Tennessee, and Texas. Students in four of the schools were assigned to an experimental group and received the multimedia curriculum. Students in the other schools were assigned to the control group and received no exposure to the curriculum. By using this approach, we were able to estimate the effects of the curriculum while statistical controlling for other factors, such as the demographic characteristics of the students, school-level variables, and other environmental factors.

We conducted the evaluation in late fall of 2006. In total, 670 students participated in the study. All students completed a survey that contained questions on materials in the curriculum. Because we were also interested in determining whether the curriculum had any short-run impact on students' attitudes toward drugs and alcohol, the survey also included five questions on attitudes. The survey was administered at pre-test and post-test, that is, before and after the students in the experimental group received the curriculum. In addition to survey data, we obtained demographic data on the students and institutional-level information. We used descriptive and multivariate statistical methods to analyze the data.

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The manner in which the data were collected creates some methodological issues. For example, by studying only schools in three states, we cannot comment on the generalizability of the findings to other states. Moreover, because the study included only charter schools, which often operate differently than traditional public schools, the findings should be considered cautiously. Still, the evaluation provides the first empirical look at the implementation of a science-based curriculum to educate middle school students about illicit drugs.

Findings

The evaluation yields the following three key findings.

Youth who participated in the curriculum gained considerable knowledge about the effects of illicit drugs on the brain and body.

On average, students in the experimental group correctly answered roughly 40 percent of the knowledge questions at pre-test. At post-test their average correct response rate was 52.1 percent. This positive change in knowledge is significant at the 99 percent confidence level. In contrast, students in the control group exhibited little change in knowledge from pre-test to post-test. On average, students in the control group correctly answered 37.3 percent of the questions on the pre-test and 37.1 percent on the post-test. This finding suggests that not only did the students in the experimental group gain more knowledge across the two points in time, but they finished the study with significantly more knowledge about the effects of alcohol and other drugs of abuse than students in the control group.

Even when controlling for demographic and locational effects, students who received the curriculum showed significant knowledge gains.

Students who received the curriculum intervention produced nearly four more correct answers than control group participants, when statistically controlling for factors such as grade level, gender, and race, as well as the effects of school location and other institutional variables. And while students in grades 7 and 8 scored higher than those students in sixth grade, the significant relationship between grade level and knowledge change was weaker than the statistical connection between exposure to the curriculum and gains in knowledge. In the end, when holding certain factors constant, participation in the experimental group – that is, receipt of the curriculum – serves as the strongest determinant of knowledge about the effects of alcohol and drugs on the brain and body.

In contrast to knowledge change, the curriculum appears to be relatively ineffective in shifting attitudes about drugs of abuse.

The data show no significant differences from pre-test and post-test on the attitudinal measures about illicit drugs. Still, the data reveal that students in the experimental group exhibited relatively strong protective attitudes about drugs of abuse at both points in time. Of a maximum of 100 percentage points that a student could receive for protective attitudes on the five survey measures, the average student earned a score of 86.5 at both pre-test and post-test. A potentially alarming finding, however, is that students in the control group showed a relatively steep decline from pretest to post-test in protective attitudes on all five attitudinal measures about alcohol and drugs. Clearly, more research is needed to determine why these drops occurred.

Discussion

The evaluation results suggest some tentative empirical support that this particular science-based educational curriculum is effective at increasing knowledge about drugs of abuse among youth. The findings have important practical and policy implications. From a practical perspective, a multimedia curriculum that provides information about the science of drug abuse may be an effective method to reach students with science and prevention information. In addition, the curriculum offers students an opportunity to build computer literacy while being exposed to health promotion and risk reduction content.

From a public policy perspective, the development of science-based interventions that can be implemented in classrooms may blunt concerns among some policymakers and practitioners about the erosion of universal school-based prevention, which has been shown to effectively decrease youth drug use (McBride, 2003). Indeed, in some respects, the heavy emphasis in K-12 education on core subjects such as reading, math, and science has pushed to the margins existing prevention programs and created a need to examine new tools to reach students on the topic of substance use and abuse. With this in mind, aligning science-based curricula on the effects of illicit drugs with national and state science standards may promote their implementation in schools. In fact, the particular curriculum examined in this brief may be attractive to schools that are exploring new ways to integrate health education into the core lesson plans for two reasons. First, the curriculum appears to place relatively low preparation demands on teachers. Second, the curriculum allows students to engage the content in a self-paced and independent manner.

Still, the findings in this brief should be viewed carefully. Indeed, the students in the evaluation may not be representative of students nationally, and the implementation of the evaluation at charter schools raises issues about the generalizability of the data across all public schools in the U.S. Nevertheless, this brief provides the first empirical look at the use of science-based classroom approach to change knowledge about illicit drugs among middle school students, and supplies some tentative support for its effectiveness.

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