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ABSTRACT

The first attempt believed to be ever made by drug prevention researchers to investigate the long term effects of a school based curriculum that may have affected student's decisions on the use of drugs is reported here. This final report contains a short section in nontechnical language describing the study and its results, and a longer section providing the detail and language characteristic of a research report. The evidence from this study indicates that a curriculum that taught students to recognize when it is warranted to be uncertain has a desirable effect three years later on those student's beliefs and behavior concerning drugs. The curriculum was not developed for the purpose of drug abuse prevention and contained no examples or exercises dealing with drug abuse prevention. The most interesting finding, from the standpoint of drug abuse prevention, is the pattern of correlations indicating that students who can recognize when it is warranted to be uncertain about drugs report less hard drug use and more soft drug use. Another important outcome of the study is the finding that warranted uncertainty is a reliable construct which, irrespective of training, affects self-reported drug use. The discovery that drug use may be significantly affected by a relatively brief classroom-based training exercise that does not contain information about drugs has interesting implications for the development of prevention strategies. (Author/AM)

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Research and Development Memorandum No. 144

THE EFFECTS OF LEARNING WHEN TO BE UNCERTAIN ON CHILDREN'S KNOWLEDGE AND USE OF DRUGS

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Introductory Statement

The mission of the Stanford Center for Research and Development in Teaching is to improve teaching in American schools. Current major operations include three research and development programs--Teaching Effectiveness, The Environment for Teaching, and Teaching and Linguistic Pluralism--and two programs combining research and technical assistance, the Stanford Urban/Rural Leadership Training Institute and the Hoover/Stanford Teacher Corps Project. The ERIC Clearinghouse on Information Resources is also a part of the Center. A program of exploratory and related studies provides for smaller studies not part of the major programs.

This R&D Memorandum is the final report of an affiliated project funded by the National Institute on Drug Abuse within SCRDT's program of exploratory and related studies.

Preface

The study reported here is, we believe, the first attempt ever made by drug-abuse prevention researchers to investigate the long-term effects of a school-based curriculum that may have affected students' decisions on the use of drugs. The evidence from this study indicates that a curriculum that taught students to recognize when it is warranted to be uncertain had a desirable effect three years later on those students' beliefs and behavior concerning drugs. The reader should be aware that the curriculum was not developed for the purpose of drug-abuse prevention and contained no examples or exercises dealing with drug-abuse prevention. The discovery in this study that drug use may be significantly affected by a relatively brief classroom-based training exercise that does not contain information about drugs has interesting implications for the development of prevention strategies.

Currently, two related curricula are under development, but because of the overwhelming legal and ethical problems presently connected with the study of drug use and drug-related activities in school children, they are directed at adults. Dr. Richard E. Clark is developing a curriculum for training teachers to generate warranted uncertainty and to model that skill in their teaching. Dr. Joan E. Sieber is developing and testing a warranted uncertainty curriculum for adult education. Both training programs deal with drugs along with other problems. Interested readers may write to the authors directly.

The format of this final report was specified by the staff of the National Institute on Drug Abuse (NIDA). We were asked to produce a short section in nontechnical language describing the study and its results, and a longer section providing the detail and language usually associated with a research report. The reader who may be interested in using the warranted uncertainty curriculum should look beyond the necessary generalizations contained in the first part to the actual data contained in the second part.

All of those who worked on this project wish to express their thanks and appreciation for the full support and encouragement of the NIDA staff. We wish also to acknowledge the assistance of Daryl C. Dawson, formerly on the legal staff of Stanford University, who advised us on how we might best protect the rights of our subjects; Roger Walsh, M.D., Staff Psychiatrist at the Stanford University Medical School, who advised us on interviewing techniques; Emily Garfield of the Institute of Public Policy Analysis at Stanford University, who most generously advised us on how to select and formulate items for our questionnaire and on how to maintain confidentiality; Dr. Daniel Meyerson, who provided us with advice and assistance in working with the principals, teachers, and students who cooperated so generously with this research; and Claudette Sprague, who gave us good-natured assistance through all stages of the project.

One of the unanticipated problems of this research was the discovery that a number of questions we had hoped to ask had to be set aside because of potential legal problems. For example, we could not look into the arrest records, delinquent behaviors, or peer and adult perceptions of drug abuse in our subject population. The information we do report, however, was carefully and ethically gathered, and we feel that on the whole it is accurate.

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PART I

Elementary school children tend not to search for information to help them solve complex problems. Instead, they seem to choose quick solutions and form poorly grounded beliefs that may not withstand pressures from friends and playmates to act in potentially harmful ways. An attempt to alter this tendency resulted in 1971-72 in an extensive teacher-training program and the development of a warranted uncertainty curriculum for use with fourth-, fifth-, and sixth-grade students (Smith, 1974). One hundred sixty-seven students in a variety of culturally and economically mixed schools received lessons in identifying different types of problems. These students learned how to search for information that would help them reduce uncertainty about certain types of questions, and they learned that they didn't always have to know the answer to problems and in some cases couldn't know them.

The effects of this training were dramatic. The children gained the emotional and intellectual power they needed to defend themselves against children and adults who urged them to change their behavior or adopt beliefs without thinking. Researchers noticed that students who had received the training began to realize that teachers are not omniscient. They would sometimes ask their teacher an impossible question only to stop in the middle with a thoughtful insight such as "Oh, you wouldn't have any way of knowing that, would you?" There were many reports of students using this new skill with brothers and sisters, parents,

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and friends outside the school. Most important, however, teachers reported that the "good" students were not the only ones interested in the technique. Children who had previously been withdrawn, bored, or frustrated in school seemed particularly excited and enthusiastic after receiving the training.

This warranted uncertainty curriculum did not involve drug-abuse problems or examples; it dealt with other matters that typify children's daily life. Clark, Kowitz, and Duckworth (1975) later had occasion to conduct research on the ways that elementary and secondary students make decisions to use "soft" drugs such as marijuana and alcohol. They found that many users of illegal drugs expressed simplistic views to the effect that drugs were "great," that they did no harm and had beneficial psychological effects. Many young nonusers of illegal drugs expressed views to the effect that drugs were bad and very dangerous. Given that such unwarranted certainty characterizes the thinking of many adults, it was hardly surprising to learn that children also hold such simplistic views. It was learned, however, that children switch at about the age of 11 from the simple view of their parents that drugs are bad to the equally simple dogma of their peers and of the drug culture that drugs are good.

These results suggested that most children, drug users and nonusers, do not recognize when it is warranted to be uncertain and hence hold very simplistic views about drugs. It seemed possible that if they knew how to recognize when it is warranted to be uncertain about drugs and knew which questions about drugs are not yet answered or answerable, they would experiment in a tentative way, reflecting their uncertainty about the consequences. The purpose of the present study was to test this conjecture. Accordingly, the students who received the warranted uncertainty training in 1971-72 were retested in 1974-75 to determine (1) whether they could remember what they learned three years earlier about warranted uncertainty, (2) whether they could apply those concepts of warranted uncertainty to questions about drugs, and (3) whether their ability to recognize when it is warranted to be uncertain was related to the extent of their drug use.

Three hundred twenty-four students participated in the 1971-72 study, either as treatment (i.e., recipients of training) or control group members. One hundred ninety-five of these students were located in 1974 for the follow-up study described here. Of that number, 139 participated in the follow-up study. (The legal rights of the students were carefully protected, including their right to refuse to participate. A few chose not to take part in the study.) A three-part questionnaire was developed from previously validated instruments. Part 1 assessed students' ability to recognize when it is warranted to be uncertain. Part 2 checked whether students could correctly categorize questions about drugs using the scheme they had been taught three years previously. And Part 3 asked about their experiences with drugs and with related behavior.

The results of this follow-up study are summarized below. The reader is cautioned to check these generally unqualified statements with the detailed procedures and data provided in Part II of this report.

1. There was clear evidence that the trained students remembered some of their warranted uncertainty training from three years before and could apply it to drug abuse problems.
2. Even though the original training had nothing to do with drugs, trained students were more capable of recognizing when it was warranted to be uncertain about drugs than were untrained students. Trained students were also significantly more able to explain why certain questions about drug abuse warranted being uncertain.
3. The initial training was remembered best over the years by the youngest students (the ones who had received the training when in the fourth grade).
4. There was no difference in the amount of correct factual information about drugs and drug abuse possessed by trained and untrained students.
5. Legal and ethical problems with subject cooperation and data collection prevented a clear test of the question of whether trained students used drugs more than untrained students. There was, however, a pattern of correlations indicating that those students who were less able to recognize when it was warranted to be uncertain were more disposed to use "hard" drugs such as cocaine, the hallucinogens, barbiturates, amphetamines, and heroin. Trained students and those better able to recognize warranted uncertainty in drug problems tended to report using "soft" drugs such as marijuana, tobacco, and liquor.

PART II

Most of us fail to recognize many of the ramifications of the complex decisions we face. We tend to assume that solutions to problems are either known or knowable, although that assumption is often unwarranted. We make decisions quickly without searching for information, accept them with a false sense of certainty, and act on them without willingness to reexamine or reverse them in the light of relevant new information (Sieber & Lanzetta, 1966; Clark, 1970).

An example of a question often treated in this doctrinaire way is, What harmful and beneficial effects result from the use of various drugs on which legal limits are placed? Many nonusers of illegal drugs hold the simplistic view that all such drugs are extremely harmful. Many users, on the other hand, express the equally simplistic view that such drugs are "great"; they do no harm and have beneficial psychological effects. Given that such unwarranted certainty characterizes the thinking of adults, it is hardly surprising to learn that children also hold such simplistic views or that they switch at about the age of 11 from the parental views that drugs are bad to the dogma of their peers and of the drug culture that drugs are good (Clark, Kowitz, & Duckworth, 1975).

It seems plausible to infer that teenagers who accept the simple dogma that drugs are good will plunge into drug use with little sense of the possible dangers, will believe things they should doubt, and will have little correct information about drugs. It seems equally plausible to infer that teenagers who continue to believe their parents' position that drugs are bad will shun drugs, will exaggerate their dangers, and will also have little correct information about drugs. But what would happen if, prior to the age of 12, children were taught to recognize when it is warranted to be uncertain and whether the answer to a question is presently known or knowable? Would they reject out of hand all of the reservations their parents or other authorities have expressed about drug use and

accept without question the dogma of the drug culture? Or would they use this skill to recognize (1) when it is warranted to be uncertain about drugs, and (2) which questions about drugs are not yet answered or answerable? How would their actual drug use be affected? Would they experiment in a tentative way, reflecting their uncertainty about the consequences? The purpose of this present research was to answer these questions. Since this study is a follow-up to research conducted in 1971-72, this report begins with the rationale and a brief description of the earlier study.

Rationale for Research on Warranted Uncertainty in Children

There is evidence that children are seldom taught appropriate ways of dealing with uncertainty. On the contrary, they are usually taught to regard problems as having clear and determinate solutions, and to look to others for simple answers. For example, Bellack, Kliebard, Hyman, and Smith (1966) observed that teachers usually provide students with specific information and then expect specific "right" answers to questions about that information. Children hunt for cues to what answer the teacher expects. Furthermore, it appears that teachers do not often allow questioning interruptions from students. Bellack and others (1966) observed in their study of pupil-teacher interaction in high school that the teachers ask 80 percent of all the questions, and that 65 percent of all student responses are in the form of simple answers.

In response to this situation, a program of research on warranted uncertainty was initiated at the Stanford Center for Research and Development in Teaching, and several attempts were made to design instructional materials that could be used to teach children to identify and analyze problems. Sieber-Suppes, Epstein, and Petty (1970) identified five types of problems or questions and developed a simple procedure for teaching children to distinguish among them. The categories are as follows:

1. Questions to which the individual knows the correct answer. E.g., What is your name? What state do we live in?
2. Questions to which the individual does not know the right answer but to which the answer is known by someone or is available in some source. E.g., Who invented the sewing machine? What principles underlie jet propulsion?
3. Questions to which no one may know the answer, but for which there is a known method of discovering the answer. E.g., What is the volume of this room? What kinds of mammals inhabit this area?
4. Questions to which no one knows the answer for sure because they concern an event that has not happened yet. E.g., When and where will there be another earthquake that measures 7 or higher on the Richter scale? When will ice again cover all of Canada?
5. Questions to which no one knows the answer, and for which there is at present no known way to discover the answer. E.g., Is there life in other galaxies? What are the smallest physical components of matter?

The teaching procedure devised by Sieber-Suppes, Epstein, and Petty was used with upper elementary school students, who demonstrated that they readily grasped the five concepts and learned how to apply them to new problems. This experiment in teaching children to express warranted uncertainty employed the experimenters as the teachers. It was recognized, however, that a useful school curriculum would have to be designed and tested using regular school teachers. Accordingly, several new efforts were initiated. Acuff and Sieber-Suppes (1972) developed and tested materials that could be used by in-service teachers to teach warranted uncertainty in the area of art education. An in-service teacher-training workshop was conducted in 1969 to train teachers in the use of uncertainty concepts in the classroom (Sieber, 1971). And, in 1971-72, a field experiment which is described in the next section, was conducted by Helen Smith (1974). It is the experiment to which the present study is a follow-up.

The 1971-72 Field Experiment in Warranted Uncertainty

The subjects in the 1971-72 field experiment were 324 students from racially and economically mixed schools; of these, 167 were in the treatment group and 157 were in the control group. Most of the minority students were Spanish surnamed and were of Mexican-American descent.

A three by two by two research design was employed using grade levels four, five, and six; male and female students; and experimental and control groups. Each treatment group (fourth-, fifth-, or sixth-grade class) was matched with a control group on total Lorge Thorndike IQ scores, age, and sex.

The experimental group teachers received a manual showing how to present the system of five categories of problems described above so that students could learn to discriminate among them. The students were asked to read materials and identify examples of the five kinds of problem situations. They then derived problems from their own school experiences and categorized them according to that system. (The training did not deal with drug-abuse prevention--only with general problem identification.) After receiving this training for about 15 minutes daily for five weeks, students were given three posttests. (1) They were given problematic questions to answer about their immediate environment. (2) They answered--orally--letters supposedly written by other children that posed questions, some of which were problematic, about the care of pets. (3) They viewed a film about pollution, after which they were asked relevant questions, some of which were problematic. The students' responses to these posttests were the data of the study.

The formal results of this experiment clearly indicated that students who had had the warranted uncertainty curriculum learned to categorize problems correctly and could generalize this ability to new areas. The informal findings were more encouraging still: students learned to argue vigorously with their peers, teachers, and parents about the bases of knowledge. They began to question their

teachers' and peers' assertions by asking how some statements that had been made could be known to be true. They asked problematic questions of their teachers only to follow their question with a thoughtful insight such as, "Oh, you wouldn't have any way of knowing that, would you?"

There were many reports of students teaching this new intellectual skill to their siblings and using it with their parents and peers outside of school. Teachers reported that both the students who previously had been withdrawn, bored, or frustrated in school and the "good" students appeared to find this an exciting and rewarding way of involving themselves.

It appears that the warranted uncertainty training generalized widely and provided students with the intellectual and emotional skills needed to cope with dogma both from their peers and from authority figures. It is plausible, therefore, to infer that the experimental group students became relatively immune to both peer and establishment dogma concerning drugs (as well as other issues), and that the curriculum served as a primary prevention strategy. The only difficulty with this inference is that the training did not deal specifically with drugs.

The follow-up study, conducted in 1974-75, was an attempt to determine whether the students had, on their own, applied these general problem-solving skills to specific drug problems in the intervening three years. If there were any indications that they had done so, the next step would be to modify the curriculum for use in school-based programs specifically aimed at preventing drug abuse.

The Follow-up Study: An Application of Warranted Uncertainty to Questions about Drugs and Drug Use

We expected that if the experimental group in the 1971-72 study had been "inoculated" against peer and adult dogma, they would differ from the matched control group in several ways:

1. They should be abler and more willing to acknowledge that they do not know the correct answer to a question about drugs or that no answer presently exists, when such is the case.

2. They should be more moderate in their choices. They should be less likely to join a drug-oriented street culture or otherwise reject the entire mainstream culture; and they should be less likely to reject out of hand the idea of experimenting with soft drugs (marijuana, alcohol, and tobacco).

To test these predictions, a questionnaire was developed and administered to the experimental- and control-group members from the 1971-72 study who could be found in the local junior high schools three years later.

Subjects

The participants in this follow-up study consisted of a subset of the experimental- and control-group subjects who participated in the original uncertainty study. As we had anticipated, not all of the students from the original study could be located. And of those who were located, some did not volunteer to participate in the follow-up study. Since the reduction in number of participants cannot be considered to have occurred randomly, it creates some serious problems of data interpretation. Therefore, we show the numbers of students participating in both years in Table 1, and will refer to this table when discussing the results of the follow-up.

The follow-up study did not involve any curricular or other treatment. The subjects simply completed a questionnaire.

Questionnaire

Design. A three-part questionnaire was developed. The first part (20 questions) assessed students' ability to recognize when it is warranted to be uncertain. The second part (10 questions) assessed students' ability to categorize questions, as described earlier. The third part (18 questions) asked students to indicate the extent to which they had used various drugs and the extent to which they had

TABLE 1

Number of Students Participating in the 1971-72 Study and the 1974-75 Follow-up, by Socioeconomic Status, Grade, and Experimental Group

Subjects[a]	Number in 1971-72 study	Number located for follow-up	Number participating in follow-up
L-SES 4th E	23	12	9[b]
L-SES 4th C	23	20	16
L-SES 5th E	32	20	10
L-SES 5th C	28	17	10
L-SES 6th E	27	22	9
L-SES 6th C	19	12	5
Subtotal	152	103	59
H-SES 4th E	27	18	14
H-SES 4th C	29	18	18
H-SES 5th E	27	20	17
H-SES 5th C	28	—[c]	—[c]
H-SES 6th E	31	16	13
H-SES 6th C	30	20	18
Subtotal	172	92	80
Total	324	195	139

[a] L-SES=low socioeconomic status
H-SES=high socioeconomic status
E=experimental group
C=control group

[b] One questionnaire had to be thrown out because the student could not read English well.

[c] Follow-up data could not be obtained on eighth-grade control students in the high SES school.

been involved in situations that led to being arrested, running away from home, getting into fights, etc. The first two parts were developed entirely by the authors. The third part is a rephrased and shortened version of a drug survey developed by Clark, Kowitz, and Duckworth (1975). All three parts of the questionnaire appear in Appendix B. The way in which responses were scored is described below under coding.

This questionnaire was designed to evaluate students' knowledge of drugs, to find out what drugs they used and how often, and to provide a socially desirable orientation to problematic issues concerning drugs. The questions were carefully worded so that they would not impart misleading or harmful information. Careful attention was also given to the way in which questions were presented, in an attempt to minimize the extent to which students would feel afraid to answer honestly.

The questionnaire underwent extensive pilot-testing and revision. Parts 1 and 2 were pilot-tested in four classes of seventh- and eighth-grade students of low socioeconomic status, with about 80 students participating. Two versions of the questionnaire were used in the pilot tests. Each consisted of 18 questions. Half of the subjects in each classroom received one version and the other half the second version. The third part of the questionnaire (the self-report of drug usage) was not administered in the pilot study because the necessary parental permission had not been granted. Students looked at this part of the questionnaire, however, and gave some constructive criticism. (Some of them wanted to fill out the drug usage section, and the researchers had to insist that they not do so.) After considerable revision, Parts 1, 2, and 3 were again pilot-tested at a high socioeconomic status private school, using 35 seventh- and eighth-grade students. These students also received two versions of the questionnaire.

The pilot questionnaires were used to determine which questions were most easily understood and which tended to elicit responses that could not be coded reliably. Much revision was called for with respect to content, wording, and length. From the 36 questions on the two forms, 20 were selected for the final version. (The reader will note that some of the same questions are used in Parts 1 and 2 of the questionnaire. The students were requested to <u>answer</u> the questions in Part 1 and to <u>categorize</u> them in Part 2.)

Administration. In each school, subjects were taken to a designated room where they were given a questionnaire. After students had taken their seats, one of the researchers explained that she and her co-workers were from Stanford and they were working on learning materials related to drug abuse. She then said:

> We would really appreciate students' help. We think we have good ideas, but they don't always work out. We would like to develop a drug "hot line" by which young children could ask older children questions about drugs. Many times younger children will talk to older students about their problems, but they will not talk to adults. We would appreciate students answering some questions written by younger children. Your answers will help us to determine whether a drug "hot line" would really be effective.
>
> Please read the directions carefully before filling out the questionnaire.
>
> If anyone has any questions, don't hesitate to ask us.
>
> Anyone who doesn't want to answer the questionnaire may go back to class.

The students filled out the questionnaire. The allotted hour for completing it was not enough time for some students; these students were therefore told to fill out only the first and third sections of the questionnaire and to omit Part 2. Students were allowed to leave and were given passes back to their classrooms as soon as they finished.

Coding. Five scores were derived from Parts 1 and 2 of the questionnaire. For convenience, these scores are referred to throughout this report as Drugs Total, Drugs DK, Drugs Uncertainty, Drugs Right/Wrong, and Drugs DK-ID.[1] These five scores were derived as follows.

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[1] "DK" stands for "don't know." "ID" stands for "identification of categories of questions calling for 'don't know' responses."

The Drugs Total score was derived from the ten questions in Part 1 which warrant uncertainty, i.e., which call for a "don't know" response. Each of the ten responses was given a score of between zero and eight according to the following rules:

0 – Gave a specific answer for a question calling for a "don't know" response or gave no answer.
1 – Slightly qualified a specific answer for a question calling for a "don't know" response (using terms such as: "I think," "I guess," "I'd say," "probably").
3 – Strongly qualified a specific answer for a question calling for a "don't know" response (answering question prefaced or followed by statements such as: "I really don't know," "I'm just guessing," I'm not really sure").
4 – Gave a "don't know" answer to a question calling for a "don't know" response.
8 – Gave a reason for not knowing the answer or suggested an appropriate means to find an answer to a question calling for a "don't know" response.

If a response was judged to fall somewhere between two of these response categories, it was given an appropriate intermediate score. The minimum possible Drugs Total score was zero and the maximum was 80. This score indicated the quality of the individual's responses to questions that warrant uncertainty.

The Drugs DK score was also derived from the ten questions in Part 1 that warrant uncertainty. Each response was given a score of one if the respondent indicated any uncertainty at all (i.e., if he received a score of one or more according to the Drugs Total rules above) and a score of zero if the Drugs Total score was zero. The minimum total score on this scale was zero and the maximum was ten. This score indicated ability to recognize when it is warranted to be uncertain, irrespective of the degree of sophistication of any further analysis that the respondent may give.

The Drugs Uncertainty score was derived from all 20 questions in Part 1. Each response was given a score of one if the individual indicated any uncertainty at all, irrespective of whether uncertainty

is warranted. The minimum total score was zero and the maximum was 20. This score indicated the degree of response set to indicate uncertainty.

The Drugs Right/Wrong score was derived from the ten questions in Part 1 which have an actual correct answer. Each response was given a score of one for the correct answer and zero for the wrong answer. The maximum total score was ten and the minimum was zero. This score indicated the individual's amount of factual knowledge about drugs.

The Drugs DK-ID score was derived from Part 2 of the questionnaire. Each response was given a score of one if the question was correctly categorized as to whether the answer to it is: known, knowable through use of presently available means, not knowable through presently available means, or not knowable for sure because it deals with prediction of an event that will happen in the future. The minimum total score was zero and the maximum was ten. This score indicated the amount the individual learned by reading the instructions, or remembered from the training three years before, about categorizing questions with respect to why they may warrant uncertainty. It was not possible to determine whether an individual student's score reflected new learning or remembering. However, a comparison of treatment and control DK-ID scores indicated whether retention played some role in the DK-ID test performance of experimental-group students.

Another set of scores was derived from Part 3 of the questionnaire. Each item was scored according to the following rules:

Example: Do you smoke (tobacco) cigarettes?

4 as often as you can
3 sometimes
2 tried it and may smoke again
1 tried it but don't plan to smoke again
0 never tried it.

Thus, a separate score was obtained for each of the 18 questions. Of these, ten scores had high enough variance to permit use of correlational analyses. These items were: friends' use, fighting, cigarettes, alcohol, marijuana, psychedelics, amphetamines, barbiturates, inhalants, and cocaine. A high score indicated much activity or involvement concerning that item (e.g., smoking, fighting). These ten scores plus the five scores described above constituted one set of dependent variables.

The inter-rater reliability of coding was brought to a very high level through practice and discussion, using pilot-training materials. In the coding of the actual responses, each questionnaire was coded by two independent coders whose scores were then compared. In most cases, no discrepancies were found. If differences did occur, however, a third person scored the questionnaire, and the score agreed upon by two out of the three coders was the one accepted.

Variables

Two kinds of dependent variables were used in this study: (1) the 15 measures derived from the questionnaire, which are described above, and (2) four measures obtained in the 1971-72 field experiment. We had hoped to have a dependent variable, namely independent evidence on some of the variables examined in Part 3 of the questionnaire. For example, we considered using teachers' and principals' perceptions of whether specific students came to school under the influence of drugs, the student's record of police arrests and pick-ups, and the incidence of delinquency, especially in connection with drug use. But we were advised that such measures would constitute a serious invasion of privacy and therefore could not be used.

The four dependent measures obtained in the 1971-72 field experiment are referred to as Pets Total, Pets DK, Pollution Total, and Pollution DK. The two Pets scores were derived from responses to questions about the care of pets (Smith, 1974). The respondents were to answer the questions as they would if they were actually talking to younger children who had asked their advice. Half of the

questions had correct answers and the other half warranted uncertainty. Both scores were derived from the questions which warranted uncertainty: the Pets Total score was derived by coding these responses according to the same basic criteria used to obtain the Drugs Total score; Pets DK was derived by counting the number of warranted uncertainty responses. The Pollution Total and Pollution DK scores were derived from responses to a set of essay questions about a Sierra Club film on pollution of our natural resources. The scores were obtained in the same way as were the Pets Total and Pets DK scores. The range of possible scores for Pets Total as well as for Pollution Total was from zero to 64. The range of possible DK scores for each was zero to eight.

The independent variable employed was the warranted uncertainty training administered three years earlier, or the lack of it, in the case of the control group.

Several demographic measures were also employed. These included grade level (seventh, eighth, or ninth), IQ scores obtained through use of the Lorge Thorndike IQ Test, sex of students, and socioeconomic status (SES) as determined by the student's school.

Research Design and Analysis

Two sets of questions guided the design and analysis of this research. The first set asked, What is the relation between whether the individual had received the warranted uncertainty curriculum three years before and how he or she responded to the questionnaire? What were the main and interaction effects of sex, socioeconomic status, training, and grade level on responses to the questionnaire? To answer these questions, each of the dependent measures obtained in the study was tabulated within each grade (seventh, eighth, or ninth) by sex, socioeconomic status (high or low), and condition (experimental or control). Similar tables were also generated for the Pets and Pollution measures obtained in the original study.

The second set of questions asked, What is the relationship among the measures, especially the dependent measures? For example, what is

the relationship between ability to recognize when uncertainty is warranted as demonstrated immediately after training and three years later? What is the relation between ability to recognize when it is warranted to be uncertain about drug-related (as well as other) matters and actual (self-reported) use of drugs? How do these relationships vary depending on treatment, sex, socioeconomic status, and grade level? To answer these questions, correlation matrixes were created using all of the students and students divided according to sex, socioeconomic status, and grade level.

Results

Extensive statistical analysis of the data was deemed inappropriate owing to the nature of the sample. The most serious problem was that the students tested in the follow-up study were not a random sample of those who participated in the 1971-72 study. Rather, they were those subjects from the first study who had not moved away and had volunteered to be tested. Neither moving nor failing to volunteer can reasonably be considered to be random variables for the purposes of this study. As shown in Table 1 (p. 10), both moving and failing to volunteer were prevalent among the low-SES students. This differential attrition resulted in two other problems: the cell size varied so much that the means and variances for some groups could not be regarded as reliable population estimates; furthermore there was no homogeneity of variance among cells. Hence, analysis of variance techniques that would ordinarily be employed on the data in Tables 2-12 were inappropriate. Finally, the drug usage responses were highly skewed. For exploratory purposes only, it was decided to examine the correlations between the variables; hence, a large number of correlations are presented in Tables 13-16. In interpreting these correlations the reader must bear in mind that the drug usage correlations are based on skewed data, and that the subjects whose data appear in these tables are not a random sample of the subjects who participated in the 1971-72 study.

The mean scores in Tables 2-5 show the differences in ability to recognize when it is warranted to be uncertain between the experimental and control group students immediately after receiving the warranted uncertainty training in 1971-72. The differences between experimental and control subjects were very large initially; but by comparing Tables 2-5 with Tables 6-9 one can see that these differences diminished greatly in the course of three years. The fact that this follow-up study uncovered long-term effects of warranted uncertainty training is, in part, a rediscovery of the fact that strong initial treatment effects may last over a long period of time even though they tend to diminish greatly.

TABLE 2

Means and Standard Deviations of Pollution Total Scores by Grade, Socioeconomic Status, Sex, and Treatment (1971-72)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	11.18	9.63	10.91	11.60			9.83	12.67	12.70	21.00	22.00	10.00
	S.D.	10.32	6.84	11.67	11.15			7.91	7.57	9.06	4.50	2.83	6.25
Exp.	$\bar{X}$	25.33	23.00	13.25	17.80	22.90	23.86	23.25	25.33	32.29	28.67	25.33	26.83
	S.D.	4.62	5.66	5.74	6.80	9.16	13.10	4.99	9.60	9.46	8.57	9.24	9.85

TABLE 3

Means and Standard Deviations of Pollution DK Scores by Grade, Socioeconomic Status, Sex, and Treatment (1971-72)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	2.50	1.60	2.50	2.20			1.80	2.70	2.60	4.30	4.50	2.30
	S.D.	2.50	1.40	2.70	2.00			2.10	1.50	1.80	0.90	0.70	1.50
Exp.	$\bar{X}$	6.00	5.00	3.30	4.20	4.40	4.00	4.50	4.80	6.80	6.50	5.70	4.80
	S.D.	1.00	1.10	1.50	1.80	1.60	2.10	1.30	1.70	1.40	1.40	1.60	1.50

TABLE 4

Means and Standard Deviations of Pets Total Scores by Grade, Socioeconomic Status, Sex, and Treatment (1971-72)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	9.82	7.88	10.92	4.20			5.67	20.67	15.30	31.00	12.50	15.67
	S.D.	6.57	4.76	8.71	5.85			8.57	10.07	5.29	8.28	9.19	11.68
Exp.	$\bar{X}$	25.33	23.67	14.50	18.60	36.20	35.29	28.00	25.17	33.29	34.17	32.00	29.67
	S.D.	2.31	12.34	11.71	14.22	12.06	18.47	4.62	9.50	14.30	7.91	4.40	4.08

TABLE 5

Means and Standard Deviations of Pets DK Scores by Grade, Socioeconomic Status, Sex, and Treatment (1971-72)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	2.20	0.90	2.70	1.00			1.00	3.70	3.30	5.40	2.00	3.30
	S.D.	1.70	1.10	2.40	1.40			2.00	2.50	1.50	1.50	2.80	2.10
Exp.	$\bar{X}$	6.30	4.70	2.80	4.00	5.30	5.70	5.50	5.20	5.60	6.70	6.00	5.80
	S.D.	0.60	2.20	2.20	3.20	1.80	2.80	0.60	1.30	2.30	1.50	1.70	1.00

As shown in Table 6, the experimental group students were slightly better able to recognize when it was warranted to be uncertain about drugs than were control group students (the experimental group mean was 7.80, while the control group mean was 6.95). The differences between trained and untrained students were most pronounced in the case of the youngest group, the seventh graders.

As shown in Table 7, experimental group students were slightly better able to identify the reason that drug-related questions evoked warranted uncertainty (experimental mean = 6.13; control mean = 4.54). Again the younger students retained the greater ability to make the distinction.

Table 8 indicates slightly higher Drugs DK scores for experimental group subjects.

As shown in Table 9, there were no differences between experimental and control groups with respect to amount of correct factual knowledge about drugs.

TABLE 6

Means and Standard Deviations of Drugs Uncertainty Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	5.27	7.25	4.90	4.00			8.33	8.67	8.10	8.50	8.00	7.33
	S.D.	3.29	2.55	1.66	5.10			1.63	3.79	2.47	2.27	0.00	3.06
Exp.	$\bar{X}$	5.80	8.33	7.00	7.09	6.80	8.57	10.25	7.33	9.43	8.33	5.67	8.00
	S.D.	7.68	2.78	1.63	2.35	2.44	1.81	0.96	2.16	1.40	2.66	4.93	1.41

TABLE 7

Means and Standard Deviations of Drugs DK-ID Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	5.30	4.57	4.67	4.83			5.33	5.50	4.11	5.75	3.50	6.33
	S.D.	1.77	1.62	1.97	2.14			2.16	2.12	1.17	2.05	0.71	1.16
Exp.	$\bar{X}$	5.50	5.00	5.75	4.60	4.56	5.00	5.75	5.00	5.57	5.17	5.67	4.67
	S.D.	2.89	2.58	1.26	1.52	2.40	2.00	0.96	0.63	2.37	1.72	2.08	1.03

TABLE 8

Means and Standard Deviations of Drugs DK Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	3.30	3.80	2.50	2.50			5.30	5.30	5.50	6.30	4.50	5.30
	S.D.	2.80	2.10	1.40	2.50			1.60	1.50	1.70	2.10	2.10	2.90
Exp.	$\bar{X}$	4.80	5.10	4.50	4.40	4.40	6.30	6.80	5.20	5.40	4.70	5.00	6.50
	S.D.	1.80	1.80	2.60	2.90	1.60	2.30	1.50	1.80	1.60	2.40	4.40	1.60

TABLE 9

Means and Standard Deviations of Drugs Right/Wrong Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	9.18	9.13	9.00	9.17			8.83	9.00	9.10	9.88	10.00	10.00
	S.D.	0.87	0.99	1.41	1.17			1.47	1.00	0.99	0.35	0.00	0.00
Exp.	$\bar{X}$	9.40	9.11	9.50	8.60	8.70	9.43	8.75	9.00	9.43	8.83	10.00	9.67
	S.D.	0.55	0.93	0.58	1.67	1.34	0.79	0.96	0.89	0.54	0.98	0.00	0.82

As shown in Tables 10-12, there were only slight differences between the experimental and control groups in their use of "soft" drugs (i.e., alcohol, marijuana, and tobacco), suggesting that the experimental group students were very slightly more prone to use soft drugs than were the controls. There appeared to be no differences between experimental and control groups in relation to their reports of hard drug usage (not shown).

TABLE 10

Means and Standard Deviations of Cigarette Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	1.82	1.88	1.58	2.50			3.83	2.67	2.20	3.00	2.00	2.00
	S.D.	1.08	1.36	0.90	1.23			0.98	2.08	1.14	1.69	0.00	0.00
Exp.	$\bar{X}$	2.25	2.25	3.00	2.00	3.00	2.29	1.75	2.67	1.86	3.33	1.33	2.33
	S.D.	1.26	1.17	1.15	1.73	1.41	1.60	0.50	1.51	1.07	1.86	0.58	1.75

TABLE 11

Means and Standard Deviations of Alcohol Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	2.55	1.75	2.58	3.50			3.83	3.00	3.10	3.00	3.00	2.67
	S.D.	1.13	1.04	1.00	0.84			0.98	1.73	1.20	1.51	1.41	0.58
Exp.	$\bar{X}$	2.25	2.28	2.75	2.60	3.80	2.86	2.00	2.83	3.57	3.33	2.00	2.67
	S.D.	1.26	1.19	0.96	1.82	1.32	1.35	1.16	1.17	1.13	1.21	1.73	1.21

TABLE 12

Means and Standard Deviations of Marijuana Scores by Grade, Socioeconomic Status, Sex, and Treatment (1974-75)

Grade		7th Grade				8th Grade				9th Grade			
SES		H		L		H		L		H		L	
SEX		M	F	M	F	M	F	M	F	M	F	M	F
Control	$\bar{X}$	1.09	1.00	1.58	3.83			2.33	2.33	2.80	2.13	2.00	1.00
	S.D.	0.30	0.00	1.00	0.75			1.75	2.31	1.81	1.55	1.41	0.00
Exp.	$\bar{X}$	1.50	1.38	2.00	1.20	2.20	2.43	1.25	2.67	3.14	3.17	1.00	1.83
	S.D.	0.58	1.06	1.41	1.79	1.55	1.90	0.50	1.86	1.57	1.72	0.00	0.98

The correlations in Table 13, however, indicate that ability to recognize when uncertainty is warranted (irrespective of whether the student received training) was weakly but significantly related to use of some drugs. All significant relationships ($p<.05$) between "uncertainty" scores (Pets, Pollution, or Drugs scale scores) and soft drug use (cigarettes, alcohol, or marijuana) were positive, and all significant relationships ($p<.05$) between uncertainty scores and hard drug use were negative. Apparently, students who can recognize when uncertainty is warranted are more disposed to take moderate risks with drugs, and less disposed to take serious risks, than are their counterparts who cannot recognize when uncertainty is warranted. In Table 14, separate sets of correlations are shown for the control and experimental groups; the same pattern emerges between ability to recognize when uncertainty is warranted and use of hard versus soft drugs, although the pattern is somewhat weaker, perhaps due to the smaller N.

It is clear from Table 13-16 that the ability to recognize when uncertainty is warranted is a highly reliable construct, especially with untrained students. Most of the measures of uncertainty (i.e., Pets Total, Pets DK, Pollution Total, Pollution DK, Drugs Total, Drugs DK, Drugs DK-ID) are related to one another at $p<.01$ in the case of the control students, and at $p<.05$ in the case of experimental students.

Table 15 indicates that socioeconomic status has some effect on the relation between ability to recognize when it is warranted to be uncertain and drug use. Low SES students who are good at recognizing when it is warranted to be uncertain are more likely to use drugs; high SES students who are able to recognize when it is warranted to be uncertain are less likely to use drugs.

Correlations between [illegible] for All Participants (N = 127)

	PETS TOTAL	PETS DK	POLLUTION TOTAL	POLLUTION DK	DRUGS TOTAL	DRUGS DK	DRUGS DK - ID	DRUGS PREFERENCES	DRUGS RIGHT/WRONG	IQ	FRIENDS TOTAL	FIGHTING	CIGARETTES	ALCOHOL	MARIJUANA	PSYCHEDELIC	AMPHETAMINE	BARBITURATES	INHALANTS
[illegible]		.001 .89	.001 .55	.001 .54	.001 .36	.001 .33	.8	.001 .31	.03	.001 .26	.01 .26	-.00	.09	.11	.11	-.08	.10	-.03	-.08
PETS DK			.001 .57	.001 .69	.001 .29	.001 .42	[illegible]	.001 .28	.06	.05 .17	.05 .20	-.07	.10	.09	.10 .11	-.04	.16	.00	-.08
[illegible]				.01 .90	.001 .43	.001 .39	.1 .2*	.001 .29	.20 .13	.001 .27	.20 .19	-.01	.05 .19	.01 .20	.05 .20	-.03	.02	-.02	.01
[illegible]					.001 .5*	.001 .33	.001 .28	.1 .2*	.09	.05 .17	.05 .20	-.04	.01 .21	.10 .14	.05 .16	.05	.02	-.03	-.05
[illegible]						.001 [illegible]	.001 [illegible]	.001 .1*	.02	.01 .05	.02	.10 -.12	-.03	.02	-.05	.01 -.23	-.10	.10 -.12	-.04
[illegible]							.001 [illegible]	.001 .07	.01	.01 .20	.01	-.11	-.04	.02	-.05	.01 -.22	-.08	.10 -.13	-.04
[illegible]								.1 .1*	-.0[illegible]	.1 .1*	.01	-.08	.05	.10 .12	.02	-.05	-.10	.10 -.14	.05 -.17
[illegible]									-.18	.01 .15	-.18	.10 -.12	.10 -.11	-.01	-.09	.05 -.18	.10 -.12	.10 -.12	-.10
[illegible]										.10	-.05	-.05	.01	.09	-.05	.03	.05	.04	-.03
											.05 .18	-.11	-.02	.05	-.03	-.08	.04	-.05	-.02
[illegible]												.001 .34	.001 .49	.001 .35	.001 .54	.001 .30	.001 .32	.01 .26	.001 .32
[illegible]													.001 .32	.001 .31	.001 .41	.01 .23	.01 .25	.05 .14	.001 .34
CIGARETTES														.001 .56	.001 .60	.001 .36	.001 .37	.001 .41	.001 .37
ALCOHOL															.001 .53	.01 .24	.01 .25	.001 .29	.001 .26
MARIJUANA																.001 .44	.001 .49	.001 .39	.001 .37
PSYCHEDELIC																	.001 .52	.001 .56	.001 .29
AMPHETAMINE																		.001 .42	.01 .23
BARBITURATES																			.001 .32
INHALANTS																			

Note: In Tables 13-16, significance levels are shown above the correlation coefficients.

Pets Total, Pets DK, Pollution Total, Pollution DK, and IQ scores were obtained in 1971-72; all other scores are from 1974-75.

TABLE 14

Correlations between Scores for Control Group (N = 61; top half of matrix) and Experimental Group (N = 66; bottom half of matrix)

	PETS TOTAL	PETS DK	POLLUTION TOTAL	POLLUTION DK	DRUGS TOTAL	DRUGS DK	DRUGS DK ID	DRUGS UNCERTAINTY	DRUGS RIGHT WRONG	IQ	FRIENDS USE	FIGHTING	CIGARETTES	ALCOHOL	MARIJUANA	PSYCHEDELIC	AMPHETAMINE	BARBITURATES	INHALANTS
PETS TOTAL		.001 .94	.001 .68	.001 .46	.01 .36	.01 .33	.13	.01 .21	.10 .19	.19 .17	.09	-.01	.05 .24	.07	.14	.07	.05 .27	.01	.10 .20
PETS DK	.001 .77		.001 .49	.001 .51	.01 .29	.01 .27	.13	.05 .26	.15	.03	.08	-.08	.10 .16	.04	.11	.05	.22	-.04	.05 -.21
POLLUTION TOTAL	.05 .25	.05 .27		.001 .92	.001 .39	.001 .40	.01 .33	.01 .29	.10 .17	.05 .23	.05 .23	.00	.05 .25	.09	.08	.07	.00	.10 -.19	-.02
POLLUTION DK	.05 .23	.001 .36	.001 .81		.01 .31	.01 .31	.001 .39	.10 .19	.15	.12	.05 .24	-.06	.05 .27	.07	.04	.04	-.02	.10 -.17	-.07
DRUGS TOTAL	.10 .19	.15	.01 .33	.05 .26		.001 .97	.001 .80	.001 .83	.16	.01 .33	.09	.10 -.20	.10	-.02	-.10	.05 -.23	-.10	-.11	-.04
DRUGS DK	.04 .22	.05 .24	.05 .28	.05 .24	.001 .95		.01 .35	.001 .79	.13	.05 .26	.08	-.14	.13	.00	.06	.05 -.21	-.07	-.07	-.03
DRUGS DK ID	-.05	-.06	.05 .27	.05 .25	.001 .42	.001 .40		.01 .36	-.06	.15	.07	.05 -.23	.10 .18	.14	-.03	-.02	-.17	-.12	.10 -.18
DRUGS UNCERTAINTY	.05 .23	.10 .17	.10 .20	.10 .19	.001 .78	.001 .71	.01 .35		.08	.05 .22	.03	.10 -.18	-.00	-.07	-.10	.10 -.19	-.08	.10	.11
DRUGS RIGHT WRONG	-.05	-.06	.05 .27	.05 .25	-.09	-.09	.00	.05 -.25		.05 .21	.03	-.12	-.08	.03	.10 -.17	.04	.02	.11	.01
IQ	.05 .22	.14	.10 .17	.02	.08	.06	.05 .22	.05 .21	-.02		.05	.10 -.17	-.08	.10 -.17	.10 -.19	.00	-.01	.00	.00
FRIENDS' USE	.10 .21	.11	-.06	-.09	-.13	-.13	-.05	.05 -.23	-.09	.05 .26		.01 .36	.001 .48	.01 .36	.001 .60	.001 .45	.10 .18	.05 .26	.001 .43
FIGHTING	.13	.04	.09	.11	.03	.04	.13	.00	.02	.02	.001 .37		.001 .40	.01 .34	.001 .51	.05 .28	.10 .19	.01 .30	.001 .53
CIGARETTES	-.09	-.04	.10	.11	.05 -.21	.05 .24	.15	.01 .28	.10	.00	.001 .48	.10 .19		.001 .51	.001 .51	.01 .30	.01 .32	.13	.01 .28
ALCOHOL	.15	.15	.01 .35	.05 .25	.07	.04	.10	.05	.15	.05 .26	.01 .34	.01 .30	.001 .60		.001 .49	.01 .29	.05 .24	.05 .25	.01 .33
MARIJUANA	.13	.03	.05 .25	.05 .22	-.01	-.08	.04	-.09	.08	.13	.001 .48	.01 .29	.001 .68	.001 .56		.001 .50	.01 .35	.01 .29	.05 .24
PSYCHEDELIC	.05 -.26	.10 -.19	.05 -.26	.10 -.20	.05 -.22	.05 -.24	.08	.10 -.18	.02	.10 -.19	.10 .16	.10 .16	.001 .63	.05 .20	.001 .38		.001 .52	.001 .47	.10 .17
AMPHETAMINE	-.09	.04	-.10	-.10	.10 -.18	.10 -.16	-.09	.05 -.22	.10	.02	.001 .39	.01 .35	.001 .41	.05 .26	.001 .59	.001 .57		.001 .63	.00
BARBITURATES	.05 -.22	-.15	-.08	-.11	.10 -.20	.05 -.23	.10 -.17	.05 -.22	.01	-.16	.05 .24	.07	.001 .57	.01 .32	.001 .46	.001 .68	.01 .35		.07
INHALANTS	-.00	.02	.06	-.05	-.05	-.04	.10 -.16	.10	.05	-.03	.05 .24	.10	.001 .46	.05 .21	.001 .50	.001 .43	.001 .36	.001 .48	

TABLE [illegible]

Correlations between Scores for Low SES Students (N = 54; top half of matrix) and High SES Students (N = 73; bottom half of matrix)

	ETHICS TOTAL	ETHICS DK	POLLUTION TOTAL	POLLUTION DK	DRUGS TOTAL	DRUGS DK	DRUGS DK 10	DRUGS UNCERTAINTY	DRUGS RIGHT WRONG	IQ	FRIENDS USE	FIGHTING	CIGARETTES	ALCOHOL	MARIJUANA	PSYCHEDELIC	AMPHETAMINE	BARBITURATES	INHALANTS
ETHICS TOTAL		.001 .21	.001 .28	.001 .22	[illegible]	[illegible] .24	[illegible]	[illegible]	[illegible]	.01 .27	.001 .26	-.12	.05 .24	.01 .31	.05 .25	.05 .21	.05 .20	.08	-.01
ETHICS DK	.001 .93		.001 .92	.001 .90	.01 .29	.01 .18	[illegible]	[illegible]	[illegible]	.05 .21	.001 .36	-.09	.01 .29	.01 .31	.05 .27	.05 .25	.01 .28	.08	-.02
POLLUTION TOTAL	.001 .62	.001 .61		.001 .90	.001 .44	.001 .42	.05 .27	.01 .31	.05	.10 .28	.10 .17	-.17	.01 .29	.05 .25	.01 .31	-.02	.10	.03	.03
POLLUTION DK	.001 .60	.001 .64	.001 .90		.001 .41	.001 .35	[illegible] .30	.01 .32	.00	.05 .22	.10 .17	-.12	.01 .32	.05 .20	.05 .26	.00	.08	-.01	-.09
DRUGS TOTAL	.01 .37	.05 .29	.01 .34	.05 .25		.001 .95	.001 .41	.001 .78	.10	.01 .27	.08	-.12	-.06	.00	.02	.10 -.16	-.11	-.12	-.14
DRUGS DK	.001 .41	.01 .35	.01 .35	.05 .27	.001 .97		.001 [illegible]	.001 [illegible]	.08	.05 .22	[illegible]	-.11	-.07	-.01	.00	.10 -.17	-.10	-.12	-.11
DRUGS DK 10	.10 .18	.13	.05 .26	.05 .26	.001 .40	.001 .41		.01 .32	-.00	.10 [illegible]	.00	.01	-.03	.07	.01	-.05	-.09	-.16	-.14
DRUGS UNCERTAINTY	.01 .37	.05 .29	.05 .25	.14	.001 .86	.001 .82	.001 .43		-.01	.05 .26	-.02	-.10	-.19	.00	-.03	-.08	-.09	-.15	-.18
DRUGS RIGHT WRONG	.13	.07	.10 .21	.10 .19	[illegible]	[illegible]	[illegible]	-.16		[illegible]	-.09	.13	.14	.09	-.01	.05	.13	.01	-.08
IQ	[illegible]	[illegible]	[illegible]	[illegible]	.10 .21	[illegible]	[illegible] .21	.14	.15		.05 .26	-.12	.09	.11	.14	.10	.15	.02	-.09
FRIENDS USE	[illegible]	[illegible]	.10 .21	[illegible]	[illegible]	[illegible]	[illegible]	-.17	[illegible]	.05		.05 .20	.001 .54	.001 .38	.001 .57	.10 .27	.01 .33	.05 .24	.01 .30
FIGHTING	.03	-.05	.05	[illegible]	[illegible]	-.11	-.17	.10 -.17	.05	-.13	.001 .35		.01 .27	.001 .39	.01 .34	.12	.13	.05 .22	.001 .37
CIGARETTES	.10 -.18	.17	.04	.04	.01	[illegible]	.04	-.03	-.13	.10 -.18	.001 .40	.01 .34		.001 .51	.001 .55	.01 .31	.001 .35	.001 .37	.001 .34
ALCOHOL	.05 .24	.01 .21	.12	.05	.05	.05	.10 .21	.03	.09	-.07	.05 .30	.10 .20	.001 .63		.001 .56	.05 .23	.05 .23	.01 .31	.05 .21
MARIJUANA	-.15	-.10	.01	.00	-.14	.13	.01	.15	-.09	.05 -.25	.001 .49	.001 .51	.001 .68	.001 .49		.01 .32	.001 .47	.001 .44	.001 .37
PSYCHEDELIC	.01 -.21	-.16	-.07	-.05	.01 -.27	.10 -.26	-.08	.05 -.22	.02	-.07	.001 .46	.01 .36	.001 .48	.01 .32	.001 .61		.001 .56	.001 .37	.11
AMPHETAMINE	-.04	.01	-.08	-.06	-.10	-.06	-.13	-.17	-.05	-.09	.01 .31	.001 .40	.001 .40	.05 .26	.001 .52	.001 .58		.05 .22	.10 .18
BARBITURATES	-.11	-.06	-.05	-.03	-.10	-.12	-.15	-.09	-.06	-.07	.10 .30	.09	.001 .47	.01 .30	.01 .37	.001 .65	.001 .61		.001 .41
INHALANTS	.10 -.18	-.16	-.01	-.01	.07	.04	.10 -.22	-.02	.02	.06	.01 .35	.01 .31	.001 .42	.01 .34	.001 .38	.001 .43	.05 .28	.05 .26	

TABLE 1

Correlations between Scales for Boys (N = 65; top half of matrix)
and Girls (N = 62; bottom half of matrix)

	PUTS TOTAL	PUTS DA	POLLUTION TOTAL	POLLUTION DA	DRUGS TOTAL	DRUGS DA	DRUGS DA ID	DRUGS UNCERTAINTY	DRUGS RIGHT WRONG	ID *	FRIENDS UNI	FIGHTING	CIGARETTES	ALCOHOL	MARIJUANA	PSYCHEDELIC	AMPHETAMINE	BARBITURATES	INHALANTS*
PUTS TOTAL		.001 .87	.001 .55	.001 .55	.05 .26	.05 .25	.03	.05 .29	.11	.01 .30	.001 .37	.07	.06	.04	.08	.13	.01	.09	.11
PUTS DA	.001 .91		.001 .56	.001 .60	.05 .20	.05 .22	.01	.05 .20	.04	.11	.01 .29	.00	.11	.06	.04	.13	.07	.10 .17	.16 .10
POLLUTION TOTAL	.001 .54	.001 .56		.001 .91	.001 .40	.001 .36	.01 .34	.30	.01 .15	.001 .37	.05 .26	-.02	.14	.15	.21	.05	.03	.02	.05
POLLUTION DA	.001 .53	.001 .61	.001 .89		.01 .33	.01 .33	.01 .35	.05 .25	.14	.05 .24	.05 .25	-.01	.16	.08	.10 .16	-.02	.07	.09	.09
DRUGS TOTAL	.01 .36	.01 .36	.001 .39	.01 .34		.001 .95	.05 .28	.001 .80	.04	.01 .30	.05 .24	.06	.33	.31	.10 .18	-.13	.06	-.06	.11
DRUGS DA	.001 .39	.001 .39	.001 .37	.02 .32	.001 .96		.05 .29	.001 .73	.02	.05 .26	.05 .22	.04	.12	.08	.15	.10 -.17	.13	-.07	.09
DRUGS DA ID	.11	.09	.16	.10 .19	.001 .53	.001 .46		.10 .20	.09	.13	.11	-.01	.13	.05 .21	.05 .21	.00	.06	-.12	-.12
DRUGS UNCERTAINTY	.01 .31	.01 .33	.05 .26	.05 .23	.001 .83	.001 .80	.01 .51		-.02	.10 .19	.05 .21	.32	-.01	.13	.10 .19	.11	.00	-.06	-.02
DRUGS RIGHT WRONG	.10 .19	.15	.07	.01	.01	-.02	-.17	-.15		.15	-.03	-.27	-.10	.01	.08	.12	-.16	-.05	-.05
ID	.10 .39	.10 .21	.09	.05	.10 .18	.11	.05 .26	.05 .28	.01		.001 .37	-.07	.05	.08	.06	-.13	-.13	[redacted]	.08
FRIENDS UNI	.14	.12	.12	.13	.10 -.17	.10 -.19	.09	.001 -.37	.12	-.04		.05 .27	.001 .40	.10 .20	.001 .42	.02	.07	.13	.01 .32
FIGHTING	.08	-.12	.00	-.08	.05 -.27	.05 -.24	-.10	.01 -.34	.16	-.25	.001 .41		.14	.10 .18	.001 .43	.13	.09	.05 .22	.01 .29
CIGARETTES	.05 .21	.05 .27	.05 .24	.05 .26	.10 -.17	.10 -.19	-.13	.05 -.22	.12	-.12	.001 .56	.001 .42		.001 .41	.001 .44	.10 .16	.02	.01 .31	.05 .25
ALCOHOL	.05 .21	.05 .28	.01 .29	.05 .24	-.04	-.03	.02	-.13	.05 .22	.02	.001 .51	.001 .43	.001 .72		.001 .49	.04	.09	.10 .17	.01 .29
MARIJUANA	.13	.10 .18	.10 .17	.14	.05 -.26	.05 -.26	.10 -.15	.01 -.33	.01	-.15	.001 .65	.001 .39	.001 .72	.001 .59		.02	.00	.05 .21	.01 .28
PSYCHEDELIC	-.13	-.06	.15	.11	.01 -.33	.01 -.32	-.09	.01 -.33	-.03	-.14	.001 .45	.001 .39	.001 .45	.001 .41	.001 .65		.00	.001 .21	.28
AMPHETAMINE	.09	.10 .17	.02	-.01	.10 -.20	.10 -.19	.10 -.18	.05 -.23	.05	.02	.001 .49	.01 .34	.001 .49	.001 .42	.001 .69	.001 .52		-.03	-.04
BARBITURATES	-.03	.18	.08	.00	.10 -.18	.10 -.19	.10 -.17	.20	.10 -.04	-.14	.01 .35	.10	.001 .46	.001 .41	.001 .51	.001 .56	.001 .49		.001 .43
INHALANTS *	-.06	-.04	.05	-.02	.10 -.19	.10 -.17	.05 -.21	.10 -.19	-.02	-.15	.01 .32	.001 -.38	.001 .46	.05 .25	.001 .44	.001 .41	.01 .31	.05 .26	

Discussion

It is clear that the training in recognizing warranted uncertainty that the students had received three years earlier generalized to student responses to the questionnaire administered in the present follow-up study. Not only were there still differences in ability to recognize when uncertainty is warranted, there were also small differences in drug use in relation to the training.

The most interesting finding, from the standpoint of drug abuse prevention, was the pattern of correlations indicating that students who could recognize when it is warranted to be uncertain about drugs reported less hard drug use and more soft drug use. This was true for both experimental and control subjects, which indicated to us that some students in the control group could handle warranted uncertainty without being trained. This may not be unusual, but it probably contributed much error variance in our comparison of the experimental and control groups. Training may be most useful for those who are initially poor at identifying when it is warranted to be uncertain. Future research in this area could profitably center on:

1. Finding a more easily administered test of ability to recognize warranted uncertainty.
2. Taking a baseline measure of the ability to recognize warranted uncertainty before training and looking for associations between pretraining ability and indices of drug use.
3. Investigating the effects of drug-related examples and exercises in the training on indices of drug use.

Another important outcome of this study was finding that warranted uncertainty is a reliable construct which, irrespective of training, affects self-reported drug use.

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APPENDIX A

Procedures for Gaining the Cooperation of Schools, Parents, and Students and for Protecting the Participants' Privacy

Because of the sensitive nature of the research, great care was taken to minimize objections and maximize the protection of students. Many steps were involved, and we report them here since these procedures may prove useful to other researchers in this field:

1. A letter was sent to the school superintendent explaining the project in terms of its general rationale and the specific things that the research team wanted to do at the schools. The letter was followed up with a visit to the superintendent to determine the schools in which the relevant students were likely to be currently located and to discuss procedures for administering the questionnaire.

2. A letter explaining the purpose and general nature of this study was sent to the principals of the relevant schools. This was followed up with visits to the principals to discuss further the method of locating students in their schools, to set the time and place of administration of the questionnaire, and to establish the means by which students were to be contacted and brought to a central location for administration of the questionnaire.

3. The researchers checked files at the designated schools to locate those students from the prior study who were still enrolled in the district. A list of the names of those students who were located was sent back to the principals.

4. Letters of consent for student participation were sent to parents or guardians. (Only one parent withdrew a child from the study.)

5. The day before the administration of the questionnaire principals notified students to meet in the designated rooms at the specified time. The students were not told the purpose of the meeting, nor were they ever reminded of their participation in the prior study or of a connection between the two studies.

6. A procedure was developed for separating the names of respondents from their responses.

7. The questionnaire and procedures for ensuring anonymity were reviewed in advance by the Committee on Human Subjects at Stanford University. The Committee concluded that the study did not constitute an invasion of privacy and gave its consent to proceed with the study.

8. Before completing the questionnaire the students were assured that their responses would be anonymous and that they could withdraw from completing the questionnaire at any time, if

they wished to do so. (The students seemed satisfied with the procedures for ensuring anonymity; their responses appeared to be straightforward and honest.)

9. Access to the completed questionnaires was strictly limited to those on the research team. It was agreed in advance that only the overall summary results would be reported.

APPENDIX B

Questionnaire

Questionnaire - Part 1

[Questions assessing students' ability to recognize when it is warranted to be uncertain.]

Presentation to students:

We are trying to find out if we can design a drug information "hot line" for children in elementary schools. Younger children have all kinds of questions concerning drugs. We feel they often need someone to talk to when they have questions and concerns about drugs.

We want to have older students like you answer the "hot line" calls. We know that many times older students communicate better with younger children than adults.

We have a list of questions that some 4th, 5th, and 6th grade children have asked about drugs. We would like to know how older students would answer these questions. Please give the answer you would really give if you were actually talking to children who had called in on a "hot line."

We would like you to write something for each question. [Answer spaces, not shown here, were provided, as in the example below.]

Example: Do people who take heroin for a long time have trouble giving it up?

Yes - People who try to give up heroin feel really sick.

1. Do people ever get sick from drinking too much liquor?

2. My friend gave me some pills and said that it would make me feel really good to take them. Should I try to find out what they are before I take any?

3. Were more than 1/2 of the auto accidents reported last year in Santa Clara County due to drunk drivers?

4. Can people who inject drugs get sick from using dirty needles?

5. If I start smoking marijuana, will I want to try other drugs like heroin when I get older?

6. Can you legally buy alcohol in California before you are 21 years old?

7. Will marijuana that is grown outdoors tend to be more strong than marijuana that is grown indoors?

8. My mom showed me a newspaper article. It said that marijuana harms people's ability to think. I saw another article that said marijuana doesn't hurt people at all. Which newspaper article is right?

9. Does beer contain more alcohol than hard liquor?

10. Somebody tried to sell me some downers (pills) but they didn't look right. Do all pills that are the same color do the same thing to people?

11. My mother told me that in 1890 my great-grandfather died after gulping down a whole quart of whiskey. Was it the whiskey that killed him?

12. According to the law, is it true that a kid who sells heroin in school is doing something illegal?

13. My father sometimes has one or two drinks when he gets home from work (usually martinis). Will he become an alcoholic when he gets older?

14. Was marijuana used by any people in prehistoric times?

15. Last night on T.V. I watched Emergency. I saw a guy on LSD jump off a roof because he was so freaked out. I have a friend who wants to try LSD, but I don't want him to get hurt. Does LSD make people do things like that?

16. Someday will it be legal to buy and use marijuana anywhere in the U.S?

17. I'm really worried about my mother. She smokes two packs of cigarettes a day. Can people get lung cancer from smoking?

18. How much does a person have to drink to be really drunk?

19. What was the name of the man who discovered LSD?

20. If you think someone has just taken an overdose of pills, should you try to get a doctor?

Questionnaire - Part 2

[Questions assessing students' ability to categorize questions according to the conditions under which their answers may be known.]

Presentation to students:

You may have found some of the questions very hard to answer. The reason is that most people really don't know the answers to some of these questions. We think there are four types of questions that people usually have trouble answering.

TYPE I - You may not know the answer, but you can find out the answer by asking someone who knows or by looking it up in some source (like a book).

TYPE II - No one knows the answer, but there is a known method for finding the answer like measuring, counting, or experimenting.

TYPE III - No one knows the answer and there is no known method for finding the answer.

TYPE IV - No one knows the answer for sure because it is about something that hasn't happened yet; you have to wait and see what happens.

Knowing about these different types of questions may help people answer "hot line" questions better. On the next pages are some of the questions that you probably didn't know the answer to. All the questions are either Type I, Type II, Type III, or Type IV problems. Read the question and put an X in the box that tells what kind of a question it is.

YOU CAN TEAR OUT THIS PAGE TO LOOK AT WHEN YOU ANSWER THE QUESTIONS.

[Below each of the following questions were four boxes or answer spaces, labeled by question type.]

1. Were more than 1/2 of the auto accidents reported last year in Santa Clara County due to drunk drivers? What kind of a problem is this?

2. If I start smoking marijuana, will I want to try other drugs like heroin when I get older? What kind of a problem is this?

3. Will marijuana that is grown outdoors tend to be more strong than marijuana that is grown indoors? What kind of a problem is this?

4. My mom showed me a newspaper article. It said that marijuana harms people's ability to think. I saw another article that said marijuana doesn't hurt people at all. Which newspaper is right? What kind of a problem is this?

5. My mother told me that in 1890 my great-grandfather died after gulping down a whole quart of whiskey. Was it the whiskey that killed him? What kind of a problem is this?

6. My father sometimes has one or two drinks when he gets home from work (usually martinis). Will he become an alcoholic when he gets older? What kind of a problem is this?

7. Was marijuana used by any people in prehistoric times? What kind of a problem is this?

8. Someday will it be legal to buy and use marijuana anywhere in the U.S.? What kind of a problem is this?

9. How much does a person have to drink to be really drunk? What kind of a problem is this?

10. What was the name of the man who discovered LSD? What kind of a problem is this?

Questionnaire - Part 3

[Questions about the extent to which the student has used drugs and engaged in countercultural activities.]

Presentation to students:

Since we are trying to help children with their concerns about drugs, we need to know what drugs are used by students in this area. We are really not interested in what just one person does, but we do need to know what drugs many students use. Therefore, we will not keep a record of your name and score after we count up all the answers.

We really appreciate your help in sharing this information with us. Thank you for your part in helping us gather the information we need.

Put an X in front of the answer that fits you best.

1. Do you smoke (tobacco) cigarettes?

____as often as you can
____sometimes
____tried it and may smoke again
____tried it but don't plan to smoke again
____never tried it

2. Do you drink beer, wine, or liquor?

____as often as you can
____sometimes
____tried it and may drink again
____tried it but don't plan to drink again
____never tried it

3. Do you smoke marijuana (hash, pot, grass)?

____as often as you can
____sometimes
____tried it and may smoke it again
____tried it but don't plan to smoke it again
____never tried it

4. Do you use psychedelic drugs (LSD, mescaline, etc.)?

____as often as you can
____sometimes
____tried it and may again
____tried it but don't plan to use it again
____never tried it

5. Do you take amphetamines (speed, bennies, uppers, etc.) without a doctor's prescription?

____as often as you can
____sometimes
____tried it and may again
____tried it but don't plan to again
____never tried it

6. Do you take barbiturates or sedatives (downers, sleeping pills, etc.) without a doctor's prescription?

____as often as you can
____sometimes
____tried it but don't plan to again
____never tried it

7. Do you use heroin?

____as often as you can
____sometimes
____tried it and may use it again
____tried it but don't plan to use it again
____never tried it

8. Do you use cocaine?

____as often as you can
____sometimes
____tried it and may use it again
____tried it but don't plan to use it again
____never tried it

9. Do you think your use of any of the following has INCREASED during the last 3 years? If your use has increased, please (✓).

____tobacco cigarettes
____beer
____wine
____liquor
____marijuana
____hallucinogens (LSD, etc.)
____barbiturates
____inhalants (glue, etc.)
____heroin
____cocaine

10. Do you think your use of any of the following has DECREASED during the last 3 years? If your use has decreased, please (✓).

____tobacco cigarettes
____beer
____wine
____marijuana
____hallucinogens (LSD, etc.)
____barbiturates
____inhalants (glue, etc.)
____heroin
____cocaine

11. Do any of your friends use drugs?

____none of my friends use drugs
____one or two of my friends use drugs
____several but not all of my friends use drugs
____almost all of my friends use drugs

12. In the last 3 years have your school grades been

____among the lowest in your classes?
____below average?
____about average?
____above average?
____among the best in your classes?

12. During the past 3 years, have you been picked up or arrested by the police?

___never
___yes, once or twice

If your answer is yes, please explain briefly:

_____

_____

_____

13. During the last three years, have you been absent from school?

___never
___once or twice
___3 to 10 times
___11 to 20 times
___21 or more times

14. During the last three years have you run away from home?

___never
___once or twice
___3 to 10 times
___more than 10 times

15. During the past three years, have you been in trouble with teachers or parents for fighting?

___never
___once or twice
___3 to 10 times
___more than 10 times

17. Have you ever been dismissed from school?

____never
____once or twice
____3 to 10 times
____more than 10 times