Antismoking Education Study at the University of Illinois

WILLIAM H. CRESWELL, Jr., Ed.D., DONALD B. STONE, Ed.D., WARREN J. HUFFMAN, Ed.D., and IAN M. NEWMAN, Ph.D.

A STUDY conducted in Portland, Oreg., in 1958 by Horn and co-workers (*1*) served as a stimulus for a series of studies on the smoking behavior of youth. This research frequently involved an analysis of smoker and nonsmoker characteristics in addition to studying the effects of various types of antismoking messages presented by mass media. While this information may be useful for developing public health measures, the educator generally is more concerned with research on the teaching-learning process in the classroom environment.

If health education in schools is to aid young people in resisting the pressures to smoke cigarettes, then such factors as the teacher's influence, teaching methods, curriculum materials, peer group, and parental influence need more intensive study. Before initiating such research, however, the study team at the University of Illinois agreed that a useful first step would be to conduct a modified replication of the Portland study (*1*). The purpose of this research was to determine whether the findings of Horn and co-workers on smoking by youth still held true, nearly 10 years later, and whether these findings were representative of a large population of midwestern youth.

The University of Illinois antismoking education study was one of a number of research projects supported under a contract with the National Clearinghouse for Smoking and Health, Regional Medical Programs Service, Health Services and Mental Health Administration. The original contracting period, 1966 to 1969, was subsequently extended to 1970 (see chart on page 569).

Initial Survey

The first survey (October 1966) included a study of selected sociodemographic and smoker characteristics of 23,724 students in grades 7 through 12 in public and parochial secondary schools, who resided in the Rockford-Winnebago County area of northern Illinois.

The 45-item attitude scale and two questionnaires used in the Portland study (*1*) served, with various modifications, as bases in developing instruments for the University of Illinois study.

The results of the Illinois study corresponded with many reported by Horn and associates. Both studies showed that a relationship existed between smoking behavior and parental education, paren-

Dr. Creswell is professor and head of the department of health and safety education, University of Illinois. Dr. Stone is an associate professor, and Dr. Huffman is a professor, also in this department. Dr. Newman is an associate professor of health education, University of Nebraska. *This study was completed under Public Health Service contract No. PH 108–66–192.* *Tearsheet requests to Dr. William H. Creswell, Jr., Department of Health and Safety Education, George Huff Gymnasium, University of Illinois at Urbana-Champaign, Champaign, Ill. 61820.*

tal smoking behavior, age within grade, participation in athletics, extracurricular and community activities, patterns of smoking, and smoking environment. Several major differences and trends in smoking practices were revealed by the University of Illinois study, however. In order to directly compare the smoking behavior of the Rockford school population with that of the Portland group, it was necessary to adjust for variations in grade and place of residence. The comparative smoking rates of students, by grade and sex and for the two school systems, are given in tables 1 and 2.

Examination of these differences shows that a higher percentage of Illinois young people are smoking in grade 9 (boys and girls) and in grade 10 (girls) as compared with those in Portland. Of particular significance is the substantial increase in smoking practices of the girls in Rockford during the earlier high school years. On the basis of this comparison, however, the overall rate of smoking among high school students does not appear to have changed appreciably.

With respect to the smoking behavior of youth in conforming to the practices of their parents, it was observed in the Rockford population that the smoking practices of both boys and girls tended to conform more closely to that of the father's smoking habits. In the Portland study the smoking behavior of the boys tended to be similar to that of the father, whereas the smoking behavior of the girls followed more closely that of the mother.

Differences were observed in the Rockford and Portland studies with respect to rate of student smoking according to the type of school system attended (parochial, urban, or rural). In the Portland study the smoking rate was highest among students in the parochial schools, whereas in Rockford the public schools had more smokers.

Table 1. Percentage of smokers, boys and girls combined, among students in Portland, Oreg., and Rockford, Ill., by grade

Grade level	Portland	Rockford
9	12.5	18.7
10	21.2	22.4
11	27.9	26.1
12	35.1	30.3
Total	23.3	23.8

Table 2. Percentage of smokers among students in Portland, Oreg., and Rockford, Ill., by sex

Grade level	Portland		Rockford	
	Boys	Girls	Boys	Girls
9	18.3	6.3	23.7	13.8
10	29.6	13.0	25.4	19.5
11	35.4	20.1	30.9	21.2
12	39.6	30.6	33.3	27.3
Total	30.0	16.5	27.8	19.8

Related Studies

Baseline information obtained in the initial survey was used in evaluating a series of followup studies. During the 4-year period of the project, 12 separate but related studies were completed.

Mass communication messages. The five mass communication message themes used in the study were (*a*) contemporary, (*b*) remote, (*c*) both-sided, (*d*) authoritative, and (*e*) adult-role-taking.

The experimental phase of the Illinois study, as in the Portland study, involved five experimental groups and one control group. All groups were matched as closely as possible according to rate of smoking. Then they were randomly assigned to either the control group or one of the experimental groups using the five different message themes.

This experiment was conducted over a 7-month period (October 1966 to May 1967). The five messages were presented in the form of pamphlets, flyers, and posters. Sets of these mass communication materials were prepared in accordance with the five themes and distributed to the respective experimental groups. Three distributions were made from February to April 1967, with a 3-week interval between each distribution. Following the experimental period, the University of Illinois survey form was readministered to assess the impact of the different message themes on the attitudes and smoking behavior of the junior and senior high school students.

Data collected from the experimental and control groups were analyzed in three ways: (*a*) by calculating the smoking net recruitment rate, (*b*) by measuring changes in the proportion of smokers, and (*c*) by measuring changes in the scores on the attitude scale. (The smoking net recruitment rate was calculated by subtracting the percentage of smokers in the pretest from the percentage of smokers in the post test and dividing by the percentage of nonsmokers in the pretest.)

Changes in smoking behavior according to the various message themes showed that significant

differences existed between the groups using the following messages: the contemporary theme was more effective than either the remote or both-sided approach, the authoritative theme was more effective than either the remote or both-sided approach, and the adult-role-taking theme was more effective than either the remote or both-sided approach. These results appeared to contradict those of the Portland study since the remote message was found to be most effective in Portland.

Student-centered approach. The experiment of Merki and associates (*2*), was designed to test the proposition that a student's peer group is one of the most important forces affecting his smoking behavior. The investigators used the two message themes (remote and contemporary) found to be most effective in the Portland mass communication experiment and tested them against a student-centered approach involving student symposia and class discussions at both the junior and senior high school levels. Study results confirmed the hypothesis that the personalized student-centered approach was more effective than the mass communication approach in changing student attitudes and beliefs toward a nonsmoking position.

Instrument evaluation. Rather characteristic patterns of response to certain attitude and belief statements were observed among the smokers and nonsmokers. This fact stimulated interest in the attitude-belief scale and its potential value as an instrument able to identify those students with a predisposition toward smoking. Drawing upon the experience gained from empirical testing with the scale and from the opinions of a jury composed of study team members, the 44 items in the scale were assigned weighted score values. These weighted values ranged from one to five, with the higher values being given to the nonsmoking position.

Proceeding with the objective of developing a test instrument, Alles (*3*) and Schmidt (*4*) used the scale in two separate studies to carry out more extensive analysis of the items. For both studies, data drawn from samples of college students with established smoking or nonsmoking behavior were used. Alles, employing a key selector technique analysis, identified 21 items on the scale that distinguished between the two samples. Schmidt, using a factor analysis approach, selected five factors from the scale. A total of 31 items were related to the five factors and then treated as subtest scores for analysis. Four of the five subtests showed significant differences between the smoker and the nonsmoker groups.

Knowledge achievement test. The original 44-item knowledge-achievement test on smoking behavior, developed by Ladner (*5*), has been revised. The revised form was designed for use with the attitude-belief scale as one of the two principal instruments for measuring the effects of an educational program. After field testing, test-item analysis, and revision, Irwin and co-workers (*6*) used it in their classroom experiment in smoking education.

Second attitude-belief instrument. Swanson (*7*) sought to develop another type of instrument that would aid in distinguishing between students with attitudes and beliefs characteristic of smokers and of nonsmokers. The instrument was composed of a two-part scale that combined features of the semantic differential and summated rating scales. The purpose of including the two-part scale was to attempt a more accurate assessment of student attitudes and beliefs about smoking by incorporating the less direct approach of the semantic differential scale. The aim of the study was to obtain a more valid reflection of the attitudes and beliefs of students. It is believed that students may tend to give what they perceive to be the "expected" or "correct" response.

Items on the scale were assigned weightings for purposes of scoring and factor analysis. Four of the five factors selected from the analysis revealed significant differences between the scores of smokers and nonsmokers.

Participant observation. Hypotheses derived from the findings of the first Illinois survey served as the focal points of Newman's study (*8*). Aware of limitations in the survey research, he employed participant observation as used in cultural anthropology in an effort to answer several questions relating to the social dynamics of smoking by youths. To effect the necessary rapport and relationships with students, the investigator assumed the role of a visiting foreign educator and school counselor.

Newman assumed that participant observation would reveal new information that simply could not be obtained by a self-reporting survey questionnaire. His small-scale, in-depth study covered a period of 9 months, during which 450 structured interviews, informal observations, and discussions were conducted with a randomly selected sample of ninth grade students composed of 40 smokers and 40 nonsmokers.

Newman observed principally that smoking is significantly related to social status among girls, and that peer group pressure apparently is a great deal more important as a determinant of smoking by youths than other factors usually associated with it.

The peer group relationship was quite striking in its demarcation. All the girl smokers restricted their associations to other girl smokers, and nonsmoking girls related only to other nonsmoking girls. Newman's study placed greatest importance on the influence of peers, while parents seemed to exert no significant influence on the smoking behavior of their sons and daughters. Other results of the study revealed that youth smokers as a group tended to be dissatisfied with their age. Unlike the nonsmokers, they preferred to be older. This attitude existed despite the fact that the smokers, on the average, already were older than their peers.

In discussing these findings, Newman observed that the student smokers frequently had difficulties both academically and socially. They resented what they considered to be unfair or inconsistent application of the rules against smoking. For example, they questioned the regulation that permitted smoking by teachers but disallowed students the same privilege. Newman concluded that smoking among school-age youth was in large measure compensatory behavior resulting from a generally poor adjustment in school, with performance marked by lack of success and positive recognition.

To reduce the incidence of smoking, school officials were encouraged to reevaluate their traditional authoritarian-disciplinarian role. Newman concluded that a didactic approach to smoking education is not likely to meet with success and that school officials should give less concern to smoking problems and more attention to developing ways of helping the youngsters achieve some degree of success so that they might be happier and better adjusted.

Role of materials in changing attitudes and beliefs. Rupnow's experiment (*9*) was designed to test the effects of antismoking educational materials on the attitudes and beliefs of seventh grade students. Important elements of this study involved the use of student-selected materials and the sequencing of these materials according to the steps in health behavior changes as identified by Hochbaum (*10*) and Rosenstock (*11*). The University of Illinois smoking attitude and belief scale was employed as the criterion. Experimental and control groups were pretested and post tested over a 5-week period. The results showed that students exposed to the materials made significantly more favorable changes toward nonsmoking attitudes and beliefs.

Classroom education. The study of Irwin and co-workers (*6*) represented a culmination of much of the preceding 2 years of investigation and research. Incorporated into the design of this experiment was information that had been acquired earlier about the characteristics of smokers and nonsmokers, the influence of peer groups, teaching materials, and the role of the teacher. A factorial experiment was designed to test the main effects of (*a*) teacher preparation, (*b*) classroom approach or methods, (*c*) sex of the student, and (*d*) interaction of these factors on students' attitudes, beliefs, and knowledge about smoking.

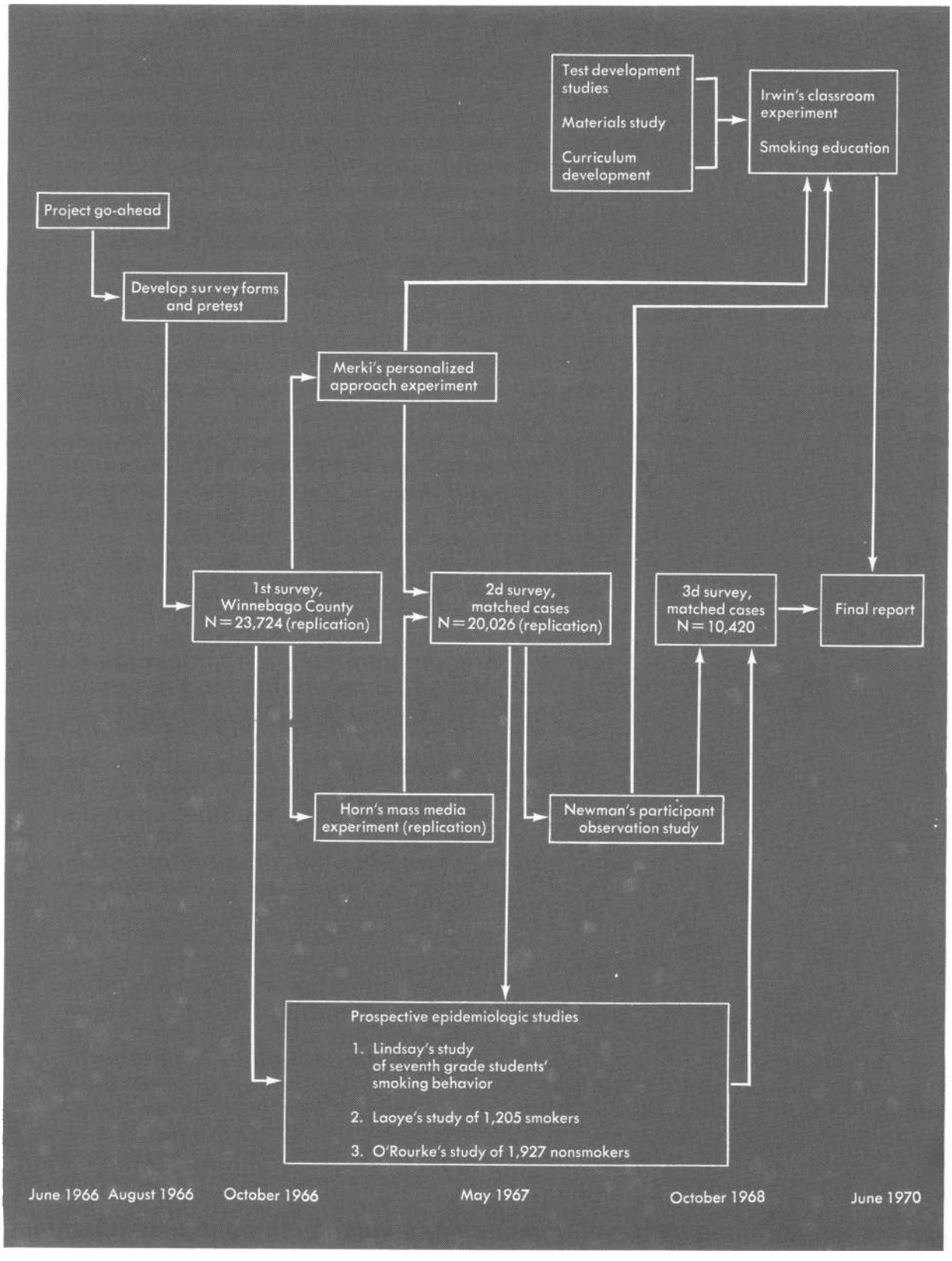
Examination of changes in the pretest to post test scores revealed a rather striking shift in the students' attitudes and beliefs in the desired direction of nonsmoking as compared with changes in scores in the knowledge test. In general, the research hypotheses were rejected, except the predicted sex difference of more favorable effects for girls. Students in the regular-classroom-teacher classes tended to show more favorable changes than those in classes with specially trained teachers.

With reference to classroom methods, the students taught by the individual study approach showed more favorable changes than students in the teacher-led and peer-led classes. This result may support Newman's contention that the school's traditional practice of punishing students for smoking behavior precludes the effectiveness of a teacher-led approach to smoking education in the school.

Prospective study of nonsmokers. Continuing with this phase of research, O'Rourke (*12*) conducted a prospective epidemiologic study using regression analyses to test the usefulness of the Illinois survey form for predicting future smoking. A sample of 1,927 nonsmokers were observed over a 2-year period. Attitude-belief variables along with certain other factors were correlated with smoking. The 21 variables tested in this multiple analysis, however, revealed a correlation (0.36) that was too low for purposes of prediction.

Although the results of this study were negative, the development of a computer program with

Processes and activities of the University of Illinois antismoking study



the capacity to analyze this type of problem efficiently and economically would seem to be an important outcome in terms of future research. Also, despite the low correlations there were indications that certain items showed promise as predictors of future behavior. For example, items focusing on the person viewing himself in terms of future behavior tended to be better predictors than attitude or descriptive items focused on the present. Continued studies and research in the processes of change in behavior will require the techniques of regression analysis and predictive equations.

Prospective study of smokers. Laoye (*13*) undertook a third prospective study of 1,205 smokers. Like the other prospective surveys, this one was conducted over a 2-year period at three school grade levels. Starting with grades 7 to 10, the students moved into grades 9 to 12. By employing the factor of time, a special effort was made to establish a more accurate classification of smoker behavior and thereby develop a further clarification of smoker characteristics. The three types of behavior analyzed were (*a*) regular to regular smoker, or one who started as a regular smoker and continued as a regular smoker; (*b*) regular to ex-smoker, or one who started as a regular smoker and then stopped; and (*c*) occasional to regular smoker, or one who started as an occasional smoker and became a regular smoker.

Responses to the survey questionnaire were scaled and treated as group scores by the three behavior groups. There were significant differences between the regular to regular and regular to ex-smoker groups in two of the three parts of the survey that were analyzed. Although this study dealt essentially with smokers, the different responses shown by the behavior groups tended to confirm and to reflect the relationships between certain demographic and social factors identified by a number of other investigators.

The following results are from Laoye's study:

1. Students who continued as regular smokers had lower educational aspirations than those who had quit smoking.

2. A higher proportion of the continuing regular student smokers had parents who smoked; this was particularly true of the father.

3. The level of formal education was higher for parents of ex-smokers than for regular smokers.

4. Ex-smoker students had a higher rate of participation in athletics and in extracurricular and community activities than the continuing regular smokers.

5. Although boys constituted a significantly greater proportion of the regular smokers at the beginning of the study, at the end of the 2 years there was no difference between sexes in the proportions of regular smokers.

6. The pattern for quitting cigarette smoking was related to the type of cigarette smoker (occasional or regular), to sex, and to age. A higher proportion of occasional smokers (44 percent) than regular smokers (26 percent) quit during the 2-year period.

7. A higher percentage of girls than boys responded "yes" to the question, will you be a smoker 5 years from now, which indicates a possible sex relationship.

There was a significant relationship between sex and rate of quitting for boys at the seventh to ninth grade levels. While the relationship was not significant at all levels, there appeared to be a consistent pattern to support the conclusion that once a girl became a regular smoker she was less likely than a boy to quit.

Analysis of these study results would seem to offer important educational benefits. According to Laoye, girls may have fewer reasons or less motivation for quitting. For example, health messages tend to emphasize the health threat in relation to the boy. Also, athletics and the importance of maintaining good physical condition may constitute a greater motivation to boys to quit. It may be that girls are more socially oriented, and peer pressure image of the smoker as an acceptable person may be felt more keenly by the girl. The sex differences noted in this study coupled with the results of Newman's study (*8*) seem to give some basis for such an interpretation. Analysis of the data also showed evidence of concern about the harmful effects of cigarette smoking even among those students who had continued as regular smokers. The full meaning and implication of this concern or attitude is difficult to interpret. Does this inconsistency suggest a predisposition to quit smoking? Or does it mean, as McKennell and associates (*14*) have suggested, that these are the truly dependent smokers who have even greater difficulty in quitting?

Smoking behavior of seventh graders. Lindsay (*15*) studied a sample of 278 junior high school students; all changed their behavior either from smoker to nonsmoker or from nonsmoker to

smoker. The purpose of this study was to identify the attitude-belief factors associated with a change in smoking behavior. A premise for this study held that factors associated with a major change of behavior, such as quitting or starting cigarette smoking, might help to identify the causes of smoking.

The study results added a new dimension to the statistical relationship between the attitude-belief variables and smoking behavior. As students changed their smoking habits over the 2-year period of the prospective study, there were corresponding shifts in their positions on the attitude-belief scales. This study has also shown that the attitude-belief scale is sensitive to changes in attitudes and beliefs by reflecting significant changes in total mean scores obtained between the different smoking behavior groupings.

Discussion of Formal Studies

Efforts to modify or change behavior included four experiments that were aimed at modifying some aspect of behavior including knowledge, attitude-beliefs about smoking, or smoking behavior. The studies included (*a*) replication of the mass communication experiment used in Portland in which five message themes were tested, (*b*) a student-centered approach in which the effects of a method emphasizing student participation were tested against the mass communication approach. (*c*) an experiment in which materials selected by the students were tested to determine their effect on the students' attitudes and beliefs about smoking, and (*d*) a study designed to test the effects of both classroom approaches and influence of the teacher in smoking education.

In the mass communications experiment, five message themes were tested in one semester. The results failed to confirm those of the Portland research. In the University of Illinois study, the contemporary message theme group had a significantly lower rate of smoking, while in the Portland study the remote message group had the lowest net recruitment rate of smoking. In general, the results of this experiment were inconclusive since only the contemporary group showed a lower rate of smoking than the control group. The conflicting results of the two studies and the general lack of significant effects in the Illinois experiment seem to preclude any significant educational implications from this research.

The hypothesis in the student-centered approach held that desired educational changes could be achieved by an educational method of personal involvement and individual interaction with class peers. To test this hypothesis, two experiments were conducted, one in the eighth grade and one in the 11th grade. The design involved two test groups, one employing a symposium-discussion method (the student-centered approach) and one using mass communication messages and a control group. In effect then, under controlled conditions, the personalized student-centered approach was tested against the two mass communications message themes that were most effective in the Portland and University of Illinois studies. The results of the experiments were evaluated from the students' changes in smoking behavior and attitude-beliefs about smoking.

Analysis of the study results showed no differences between the treatment groups as far as smoking rates were concerned; however, the eighth grade classes, which used the symposium-discussion method or student-centered approach, had significantly greater or more positive changes in their attitude-belief scores than the students in the mass communication classes. Thus in this instance the research hypothesis was at least partially confirmed in that the personalized approach produced more favorable changes in attitude and belief.

From the standpoint of educational implications, it would seem that the student-centered approach was more effective than mass communication in bringing about desired educational changes among the eighth grade students. Further, the symposium-discussion technique appeared to be more effective with junior than with senior high school students. Apparently, the peer group as a force for educational influence has greater potential at the junior high level.

Rupnow (*9*) sought to ascertain the educational effect of certain prepared materials that had been specifically designed to alert and inform the public about the hazards of cigarette smoking. It had been hypothesized that a more extensive exposure to carefully selected materials represented an important element in the smoking education program. If the abbreviated announcements and messages employed by mass media could produce changes in attitudes, beliefs, and practices, then a carefully controlled and increased exposure to such information should produce even greater results.

While Rupnow's experiment with materials rep-

resented a different aspect of the teaching-learning situation from that of the student-centered approach, other factors were also incorporated to produce greater effects. For example, the materials used were those selected and rated highest by teenagers for their appeal and informational value. The materials were then arranged in a sequence of four study sessions according to the steps identified in the model for behavior change developed by Hochbaum (*10*) and Rosenstock (*11*). These steps were (*a*) an awareness of the threat, (*b*) an acceptance of the importance of the threat, (*c*) the personal relevance of the threat, and (*d*) the susceptibility of the threat to intervention.

The test group that studied these materials showed significantly more favorable changes of attitude and belief than did the control group. It was therefore concluded that materials on the hazards of cigarette smoking constituted an important aspect of the teaching-learning experience.

The effectiveness of the teacher and the classroom approach or method and the interactions of the two factors were also studied. Three teaching approaches (individual study, peer-led, and teacher-led) were evaluated. The effectiveness of these methods and the teachers was determined by the knowledge and attitude-belief scores of the students. Two types of teachers, regular classroom and specialized, were considered. Each teacher employed all three teaching methods. The specialized teacher was one trained in smoking education.

Although the influence of curriculum and study materials was held constant for all treatment groups to test the effects of teacher and classroom methods, all groups showed significant gains in attitude-belief scores. This fact supports the conclusion that the curriculum materials and sequence of lessons were effective in producing desired educational changes.

The groups taught by regular classroom teachers who used the individual study method had significantly greater changes consistently in attitude-belief scores. Why the regular classroom teacher achieved superior results was not readily apparent. These teachers may have had outstanding rapport with their students, enabling them to achieve superior results. In any event, the results of this study should be considered when assessing the advantages of using a teaching specialist.

The apparent success of the individual study method deserves comment. The results seem to reinforce the concept that individualized instruction represents the ideal condition for teaching and learning. This approach combines the advantages of freedom and flexibility in learning with the supportive environment of the teacher as a resource if needed.

The superior results obtained with the individual study method seem to raise a serious question about certain traditional patterns of organization and teaching procedures in the schools. At the very least, these results suggest that students need more freedom and opportunity to develop initiative and self-reliance in their school experience. The results of Irwin's experiment (*6*) and Newman's participant observation study (*8*) point to the benefits of providing more attention to the individual student and greater flexibility in school programs.

The necessity of conducting experiments in the so-called natural school setting, with all of its exigencies of class structure and class size, still represents a major obstacle in educational research. While statistical techniques are available to help overcome some difficulties, there are still uncontrolled factors that may well obscure the true results of the experiment. For example, one possible explanation for the relatively poor showing of the peer-led classes in this experiment might have been the fact that, by random selection, the largest classes were assigned to this method. The greater size of these classes may have hampered the effectiveness of the group methods used.

Rates and Trends Among Illinois Youth

As stated earlier, one major purpose of the Illinois study was to determine current smoking trends among youth in secondary schools. The research team contended that a longitudinal or prospective survey of the same group of students with matched data from one survey to the next would provide a more accurate picture of trends in the smoking habits among youth than a one-time study. Therefore, three surveys were conducted—the first in October 1966, the second in May 1967, and the third in October 1968.

Data on smoking rates by grade level and sex for all three surveys are summarized in table 3. The first survey included 23,724 students from grades seven through 12. The same form and procedures were used for the second and third surveys. To expedite the collection of data, roster lists of classes also were obtained from all Winnebago County schools before the second and third surveys. The names of students on these rosters

Table 3. Comparison of smoking rates for Winnebago County (Ill.) youth, by grade, sex, and year, 1966-68

Grade	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
	1966 group (N=23,724)			1967 matched group (N=20,026)			1967 unmatched group (N=3,698)		
7	15.3	7.6	11.5	14.4	7.0	10.7	20.3	12.1	16.6
8	18.4	11.5	15.1	16.5	9.3	13.0	27.8	23.4	25.7
9	22.6	13.7	18.1	20.4	12.2	16.2	34.6	24.3	29.9
10	24.9	19.0	21.9	21.6	17.7	19.6	40.4	26.0	33.4
11	30.3	20.8	25.6	25.7	20.3	23.0	51.8	24.6	40.7
12	33.5	26.8	30.1	31.5	24.5	27.9	41.3	38.4	40.0
	1968 group (N=12,968)			1968 matched group (N=10,420)			1968 unmatched group (N=2,548)		
7									
8									
9	21.0	17.6	19.3	19.3	16.4	17.7	27.0	22.3	24.8
10	26.1	18.8	22.6	23.8	16.6	20.2	32.6	25.7	29.9
11	30.4	22.2	26.2	29.2	21.7	25.3	36.2	24.6	30.7
12	31.7	27.4	29.4	29.2	27.3	28.2	48.4	28.8	38.7

were then checked against the names of the students participating in the first survey. Coded answer forms were prepared for all matched students. Thus, from the second survey, made approximately 8 months after the first survey, a total of 20,026 matched students and 3,698 unmatched students were obtained. Approximately 16 months later (October 1968) the third survey was conducted, and a total of 10,420 matched and 2,548 unmatched students were obtained.

Comparison of smoking rates for the matched students in the second and third surveys revealed almost similar results. Comparison of these two groups with the group in the first survey showed that smoking rates were slightly lower at each grade level for both boys and girls. It should be noted, however, that these grade-level comparisons actually represented different samples of students, and the differences were probably well within the range of sampling error.

Examination of these data from a longitudinal perspective made it possible to record observations of the same sample of students at different points in time. Thus, when the three surveys were concluded, observational data had been recorded over the 2 years for four different samples or cohorts of boys and girls.

Data in table 3 reveal an important factor: the difference between the percentages for matched and unmatched smokers. For example, 11th grade boys in the matched survey (1967) had a smoking rate of 25.7 percent, while the unmatched survey revealed a smoking rate of 51.8 percent.

Data in table 4 show the number of students in each of the 2-year grade groups, the rates of smoking at the beginning and end of the 2-year period, and the increased rate of smoking for each group. Girls generally had lower smoking rates than boys. All girls, however, had a higher rate of increase in smoking for the 2 years, except in eighth to 10th grades.

Table 4. Smoking rates and increase for boys and girls at 4 grade levels, Winnebago County, Ill., 1966-68

Number	2-year grade levels		Percent smoking		Percent increase
	1966	1968	1966	1968	
Boys:					
1,471	7 to 9		14.4	19.3	4.9
1,365	8 to 10		16.5	23.8	7.3
1,140	9 to 11		20.4	29.2	8.8
1,701	10 to 12		21.6	29.2	7.6
Girls:					
1,598	7 to 9		7.0	16.4	9.4
1,339	8 to 10		9.3	16.6	7.3
1,220	9 to 11		12.2	21.7	9.5
1,216	10 to 12		17.7	27.3	9.6

For both boys and girls at every grade level (table 5) the proportion of smokers was higher in the unmatched group. Further examination of these data reveals that the differences are significant at all grade levels for both sexes except for the 11th grade girls. The question is raised as to the cause of this higher smoking rate among the unmatched sample. Could some particular characteristic of smoking or nonsmoking behavior effect such a difference?

Under-Reporting of Smokers

Most research on smoking among youth, including the University of Illinois study, has revealed an association between smoking and poor academic performance. These data also indicate that smokers are less involved in the school's extracurricular activities and have lower educational aspirations. Each factor is closely related to the tendency to drop out of school. In a related study, Crowdy and Richards (*16*) showed that among a group of 5,000 British soldiers, the majority of smokers were dropouts from school. In addition, there was evidence linking cigarette smoking to illness, which presumably would be related to a higher absentee rate for students who are cigarette smokers.

Newman (*8*) showed that smokers are more likely to be tardy, truant, or suspended from school. This information leads to the assumption that at any given time more smokers are likely to be absent than nonsmokers. Hence any data on a school population would be a conservative estimate of the actual number of adolescent smokers in the school.

We hypothesized that in any two surveys separated by a significant interval of time, smokers would constitute a significantly higher proportion of subjects who were available for only one survey as compared with the proportion available for both surveys. It would follow, then, that populations which could be matched in two surveys (that is, subjects who could be sampled in both surveys) would contain a higher proportion of nonsmokers than populations which could not be matched in the same two surveys (that is, subjects who would be absent from either survey). This, coupled with the tendency for certain smokers to avoid disclosing their smoking habits, as Newman has described, compounds the error.

One troublesome problem in conducting prospective studies of student populations is obtaining reliable data. The mobility of today's students and the normal rate of absenteeism can lead to serious errors and to false conclusions about the data. For example, one student in the Illinois study completed the first survey form three times at three different schools during the 2-week period of the survey.

Keeping a record of every student and matching the data over three surveys demands much of the investigator. Nevertheless, such a procedure seems to be necessary to establish greater confidence in findings that depict trends and to create a baseline for evaluating the effects of future educational programs.

Conclusions

From the school's standpoint, then, since at any given time more smokers are absent from the classroom than nonsmokers, antismoking education is not reaching the prime population and therefore its maximum efficiency is lost. This loss increases with grade level as more smokers than nonsmokers become early dropouts. To maximize efficiency, antismoking programs should be designed to fill prolonged or repeated blocks of time in an attempt to avoid smoker absenteeism. Antismoking programs should come early in the student's educational sequence—long before he is a smoking absentee or a dropout who smokes.

In our society the school is still the last chance for a controlled exposure to health education. Those developing educational programs must recognize the unique characteristics of their target population lest the extent of the problem is underestimated and programs are designed that do not meet the problem.

The major emphasis of health education is aimed at preventing health problems. This tenet is particularly true for smoking education programs in schools where a comparatively small percentage of youths are habituated to smoking. At the same time it is important to understand the behavior of smokers and to continue the effort to help them lessen or cease smoking. Certainly, an abundance of evidence points to the health benefits from a reduction or cessation of smoking at any age level. Moreover, an improved understanding of the behavior patterns of smokers might well hold important implications for other tasks of health education.

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Table 5. Matched and unmatched samples, smokers and nonsmokers, University of Illinois surveys, 1966-68

Status	Matched		Unmatched		Significance
	Number	Percent	Number	Percent	
Boys					
7th grade:					
Smokers	275	14.40	71	20.23	$z=2.790$, $P<0.01$
Nonsmokers	1,635	85.60	280	79.77	
8th grade:					
Smokers	306	16.56	105	27.70	$z=5.10$, $P<.001$
Nonsmokers	1,542	83.44	274	72.30	
9th grade:					
Smokers	373	29.39	114	34.65	$z=5.69$, $P<.001$
Nonsmokers	1,456	79.61	215	63.35	
10th grade:					
Smokers	347	21.55	141	40.40	$z=7.38$, $P<.001$
Nonsmokers	1,263	78.45	208	59.60	
11th grade:					
Smokers	371	25.71	158	51.80	$z=9.01$, $P<.001$
Nonsmokers	1,072	74.29	147	48.20	
12th grade:					
Smokers	381	31.51	126	41.31	$z=3.27$, $P<.01$
Nonsmokers	828	68.49	179	58.69	
All grades:					
Smokers	2,053	20.84	715	35.43	$z=14.12$, $P<.001$
Nonsmokers	7,796	79.16	1,303	64.57	
Girls					
7th grade:					
Smokers	135	6.97	35	12.15	$z=3.09$, $P<.01$
Nonsmokers	1,802	83.03	253	87.85	
8th grade:					
Smokers	168	9.33	77	23.40	$z=7.35$, $P<.001$
Nonsmokers	1,632	98.67	252	76.60	
9th grade:					
Smokers	232	12.17	68	24.29	$z=5.50$, $P<.001$
Nonsmokers	1,674	87.83	212	75.71	
10th grade:					
Smokers	308	17.71	85	25.99	$z=3.50$, $P<.001$
Nonsmokers	1,431	82.29	242	74.01	
11th grade:					
Smokers	304	20.32	52	24.64	$z=1.45$, $P<.147$
Nonsmokers	1,192	79.68	159	75.36	
12th grade:					
Smokers	319	24.56	94	38.37	$z=10.46$, $P<.001$
Nonsmokers	980	75.44	151	61.63	
All grades:					
Smokers	1,466	14.41	411	24.46	$z=10.46$, $P<.001$
Nonsmokers	8,711	85.59	1,269	75.54	

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The first phase of the University of Illinois antismoking study was a modified replication of an earlier study in Portland, Oreg. Results from the first of three surveys of the Winnebago County (Ill.) school population, seventh through 12th grades, tended to concur with findings from previous studies on the behavior of youthful smokers. While findings for the overall rate of smoking by youth in the Illinois study were similar to those of earlier studies, certain differences were revealed. The early adolescent girl was smoking at a considerably higher rate than her counterpart of 10 years ago. A higher rate also was observed for ninth grade boys, but the difference was not as pronounced as for girls.

Baseline data obtained from the initial survey served as a reference point for evaluating a series of continuing and related studies and as the information necessary for effecting a comparative analysis with the mass communication experiment of the Portland study. The Illinois experiment indicated that the contemporary message theme (immediate effects of smoking) was most effective in reducing the rate by which youth take up smoking. In contrast, the remote message theme was found to be most effective in Portland.

In addition to the comparison studies, 12 separate but related studies were also completed. Among these investigations were the development of test instruments, educational materials, classroom teaching-learning experiments, and prospective surveys designed to test the predictability of selected factors in relation to future smoking behavior.