

Health Concerns and Attitudes Regarding Fluoridation

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ALTHOUGH worries about sickness are common topics of popular discussion, relatively little attention has been devoted to research on the effects of personal concerns about health. One survey of attitudes concerning six serious diseases has sought to identify some sources of health anxiety (1), but few attempts have been made elsewhere to assess the impact of such apprehensions on public support of health programs.

Since the protection and promotion of public health and welfare have been important local responsibilities, health proposals that require public approval or acceptance have been common and significant issues in many communities. Unless attention is focused on the role of health concerns in shaping opinions on public health issues, an important variable in efforts to adopt preventive health programs will be overlooked. The purpose of this investigation, therefore, is to examine the effects of expressed health concerns on attitudes and behavior regarding an important community health program.

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Despite relative neglect in prior research on public opinion, anxiety or fear has occupied a prominent role in experimental studies of techniques for securing the adoption of recommended health practices. In a classic study, Janis and Feshbach found that communications which aroused minimal fears were more likely to be successful in persuading students to adopt recommended dental health procedures than were strong or moderate fear-arousing messages (2). Although the results of the original study were modified by subsequent investigations (3, 4), the belief generally has been accepted that fear or anxiety is an unsuccessful basis for encouraging people to take preventive health action (5).

Recently this assumption has been challenged by the finding that the association between fear or anxiety and preventive health behavior is affected by socioeconomic status. In a replication of the Janis-Feshbach experiment, Haefner discovered that the minimal fear-arousing message was most effective in encouraging children from high-status families to adopt endorsed practices in toothbrushing and oral hygiene and that the strong fear-arousing message was most successful with low-status students (6). Rosenstock noted (7):

If, as seems likely, Janis and Feshbach's sample in Greenwich, Connecticut, was primarily drawn from upper class families, the apparent discrepant findings of the two studies are readily reconciled. . . . If Haefner's findings can be replicated, especially in settings

using other health content, and with other age groups, the attempts to induce fear might, for certain subgroups of the population, be much more effective than a more neutral . . . approach.

In another study, Robbins, who found no relation between anxiety and the acceptance of influenza vaccinations or the use of employee health units, concluded: "It is also possible, if not probable, that the relationship between anxiety and behavior is very complex and a simple linear relationship is not to be expected (8a)." This investigation, therefore, will seek to explore the impact of expressed health concerns on a major public health issue at different socioeconomic levels as defined by income, education, and occupation.

One of the most important and controversial health issues in recent years is the fluoridation of community water supplies. While public attitudes on fluoridation have been related to concepts of "powerlessness" (9), "relative deprivation" (10), and "anti-scientism" (11,12), as well as social and economic variables (13), little information has been available on the association between beliefs about fluoridation and basic health concerns. The fluoridation issue, therefore, presented an unusual opportunity to explore the association between expressed health concerns and attitudes regarding public health proposals.

Expressed Health Concerns

In November 1965, Detroit—the largest city to do so—held a referendum on fluoridation. To identify characteristics associated with attitudes and voting behavior regarding this important public health proposal, 596 Detroit adults, chosen in a multistaged area probability sample, were interviewed by professional interviewers, under the direction of the author, shortly after the referendum. Results of the study reflected, within a few percentage points, the social and economic characteristics of the city reported in the 1960 U.S. census as well as the outcome of the referendum, which resulted in the passage of fluoridation by a narrow margin.

As part of this survey, the respondents were questioned concerning six diseases: lung cancer, tooth decay, heart disease, stomach ulcers, food poisoning, and bone disease. After a series of queries on the attitudes of other people, the

respondents were asked, "Have you ever worried about (each disease)?" From the responses to the questions, a Guttman-type scale was developed having a coefficient of reproducibility of 0.92. With this scale, which has been termed the "scale of expressed health concerns," a score was computed for each of the 596 respondents by totaling the number of diseases about which the respondents admitted a worry. To examine attitudes among respondents with both low and high concerns as well as among those who expressed no anxieties about diseases, the scale was dichotomized between worry about one to three and four to six diseases.

Both the question and the items used to develop this scale were essentially similar to the measure of experienced concerns used by Robbins, who asked his respondents, "Have you, personally, ever felt worried about (each disease) in your own case?" His study also demonstrated that the index of experienced concerns, based on the "number of those serious diseases reported as having been a source of worry," is highly related to general dimensions of affective anxiety regarding illness (8b).

Although the Detroit study focused primarily on the association between expressed health concerns and positions on fluoridation, the scores on the scale were related to basic demographic attributes such as age and socioeconomic status. Neither variable was strongly associated with general health concerns nor with worries about any particular disease.

A relatively direct measure of the relationship between expressed concerns and preventive health behavior was provided by responses to a uniform series of questions concerning steps that can be taken "to prevent tooth decay from happening." A simple index of dental health information was constructed from answers to this question by totaling the number of methods that each respondent suggested to reduce dental caries. Positions on the index of dental health information were related to levels of expressed health concerns (table 1).

Although most respondents possessed only a moderate amount of information on dental health—as indicated by two suggestions they offered for preventing tooth decay—growing health worries were strongly related to increasing information about methods of reducing

Table 1. Expressed health concerns and index of dental health information

Number of methods suggested for preventing tooth decay	Expressed health concerns (percent)		
	None (N=131)	Low (N=354)	High (N=108)
None.....	25	14	13
1.....	28	23	19
2.....	31	42	31
3 or more.....	15	20	36

NOTE: $X^2=27.376$, 6 degrees of freedom, significant at 0.001 level.

dental disease. With the possible exception of persons who mentioned only one preventive dental health practice, the patterns were relatively clear at each level of dental information. A majority of the respondents with no health worries offered none or one suggestion, the largest group with low anxiety advanced one or two methods, and most persons with high anxiety suggested two or more ideas for preventing dental caries. The responses indicated that health concerns were related to preventive behavior regarding at least some personal health problems.

Health Concerns and Fluoridation

Expressed health concerns, however, were not related to responses to the question, "Would you say that you strongly support, support, oppose, strongly oppose, or are you undecided about fluoridation?" Persons with high apprehensions about illness were no more likely to support fluoridation than respondents who voiced worries about few or none of the diseases. Similarly, no discernible or significant association was found between expressed health concerns and knowledge about fluoridation.

To some extent, the absence of a direct correlation between worries about diseases and attitudes on fluoridation was affected by a disposition to regard the proposal as a political rather than a public health issue. Although a large proportion of the respondents identified fluoridation as a method of reducing dental caries, a nearly identical percentage did not perceive it as a recommended health procedure. Lack of familiarity with the position of most dentists on the fluoridation issue was admitted

by 63 percent of the people interviewed. Of the remainder, who guessed, 27 percent believed that most dentists supported fluoridation, and 10 percent thought they were generally opposed or neutral. Popular confusion regarding the agreement or disagreement of medical and dental authorities about the merits of fluoridation probably has produced different evaluations of the proposal. Perhaps assessments of the costs and benefits of fluoridation have been influenced by personal positions in the social structure of the community.

Since research has indicated that the effects of anxiety or fear on health behavior have been modified by social status, the associations between health concerns and positions on fluoridation were examined separately at different levels of socioeconomic status. For this purpose, a special index of socioeconomic status was constructed from a three-dimensional matrix including the traditional measures of social class: income, education, and occupation of head of household. Combined scores of the variables weighted equally were compiled for each person and divided into three socioeconomic levels.

The associations between expressed health concerns and positions on fluoridation at different socioeconomic levels are presented in table 2. As the table indicates, support of fluoridation was inversely related to socioeconomic status.

Table 2. Expressed health concerns and positions on fluoridation, by socioeconomic status

Expressed health concerns by socioeconomic status	Number	Position on fluoridation (percent)		
		Support	Oppose	Undecided
Low status.....	175	63	22	15
None.....	35	54	29	17
Low.....	108	63	22	15
High.....	32	75	12	12
Medium status...	150	43	25	33
None.....	34	29	38	32
Low.....	89	46	20	34
High.....	27	48	22	30
High status.....	194	39	27	33
None.....	43	46	26	28
Low.....	112	39	29	32
High.....	39	33	26	41

NOTE: $X^2=76.032$, 16 degrees of freedom, significant at the 0.001 level.

Approval of fluoridation declined, while both opposition and uncertainty grew, as social status increased.

Perhaps even more striking were the associations between health concerns and positions on fluoridation within socioeconomic groups. Among persons of low socioeconomic status, support of fluoridation increased and both opposition and indecisiveness declined at successively higher levels of expressed health concerns. Although the strongest overt opposition to fluoridation was found among people of moderate socioeconomic status who had no worries about the diseases, most of those respondents occupied an intermediate position between high- and low-status groups. At the upper end of the socioeconomic spectrum, support of fluoridation dwindled as health concerns increased. Opposition did not gain simultaneously, but indecision about fluoridation grew directly with the number of diseases about which concern was expressed among adults of high socioeconomic status.

Discussion

Perhaps the impact of health concerns has been shaped by the perceived benefits and disadvantages of a comprehensive health program such as fluoridation. For respondents at low socioeconomic levels, who perhaps could not afford extensive private treatment, the degree of concern about diseases was directly related to opinions of fluoridation. Low status persons who expressed numerous health worries were more favorable toward a program to reduce a prevalent and expensive disease than those who were relatively indifferent to the threat of illness.

On the other hand, the association between health concerns and support for fluoridation was reversed among people at high socioeconomic levels, who could afford the costs of private dental care. Resistance to fluoridation among high-status persons with relatively intense health concerns, however, was more likely to be expressed as uncertainty or skepticism than as direct opposition. Perhaps attitudes on fluoridation, particularly among the relatively affluent, were influenced by the alleged disagreements between medical and dental authorities on the safety or value of fluoridation. People

who could afford the expense of preventive or remedial health care were apt to translate their worries into skepticism about fluoridation, but the potential benefits of fluoridation seemed to outweigh the possible disadvantages for people with strong health concerns, who may have lacked the economic resources for private health care.

Conclusions

Under some conditions, worries about health have had an important effect on attitudes regarding public health issues. Expressed concerns about six serious diseases formed relatively clear and consistent patterns that not only satisfied the criteria for a cumulative scale but also existed in an independent dimension apart from the effects of relevant demographic attributes. A strong correlation was found between increasing health concerns and growing information about dental health procedures or methods of preventing tooth decay.

Results of the Detroit survey suggested that levels of health concerns were not directly related to attitudes about fluoridation. When the influences of socioeconomic status were removed, however, clear and meaningful patterns between health concerns and the approval or disapproval of fluoridation were revealed. Whereas skepticism about the acceptability of fluoridation increased in relation to health concerns among high-status adults, growing health anxieties among respondents at low socioeconomic levels produced a greater willingness to repress doubts about fluoridation in favor of its potential benefits. The opportunity to reduce a widespread and financially burdensome disease at little personal expense was more attractive to low-status persons with numerous worries about health than to their counterparts at upper socioeconomic levels.

This investigation, which has focused largely on attitudes and behavior toward an important public health measure, has indicated that, under certain conditions, expressed health concerns were associated with preventive health actions. A direct association between health concerns and personal behavior was found on the question of information about dental health practices. On other issues, the relationship was influenced by intervening characteristics, such

as socioeconomic status, which may have inspired different evaluations of the benefits to be derived from community health programs such as fluoridation. Clearly, there is a need as well as an opportunity for additional research to specify the conditions under which health anxieties impede or promote the adoption of public health programs.

Summary

In November 1965 a multistaged area probability sample of 596 Detroit adults was surveyed soon after a major referendum on fluoridation was held in the city. A scale of expressed health concerns was derived from a series of questions relating to personal worries about six serious diseases: lung cancer, tooth decay, heart disease, stomach ulcers, food poisoning, and bone disease. Levels of health concerns were directly and significantly related to positions on an index of dental health information that had been developed from questions about methods of preventing dental caries.

Although expressed health concerns were not directly associated with attitudes on fluoridation, the positions of the respondents on the referendum issue were examined at three socioeconomic levels. Support for fluoridation was inversely related to increasing socioeconomic status. Moreover, persons at low socioeconomic levels with numerous health concerns favored fluoridation, but high-status respondents with strong health concerns were undecided about the issue. Perhaps this relationship was influenced by perceived disagreements about the merits of fluoridation and by different evaluations of the costs and benefits of the program.

REFERENCES

- (1) Levine, G. N.: Anxiety about illness: Psychological and social bases. *J Health Hum Behav* 3: 30-34 (1962).
- (2) Janis, I. L., and Feshbach, S.: Effects of fear-arousing communication. *J Abnorm Psychol* 48: 78-92 (1953).
- (3) Goldstein, M. J.: The relationship between coping and avoiding behavior and response to fear-arousing propaganda. *J Abnorm Psychol* 58: 247-252 (1959).
- (4) Leventhal, H., and Niles, P.: A field experiment on fear-arousing with data on the validity of questionnaire measures. *J Personality* 32: 459-479 (1964).
- (5) Society of Public Health Educators Research Committee: Review of research related to health education practice. *Health Educators Monogr* 1: 70 (1963).
- (6) Haefner, D. P.: Arousing fear in dental health education. *J Public Health Dentistry* 25: 140-146 (1965).
- (7) Rosenstock, I. M.: Why people use health services. *Milbank Mem Fund Quart* 44: 116 (1966).
- (8) Robbins, P. R.: Some explorations into the nature of anxieties relating to illness. *Genet Psychol Monogr* 66: 76-131 (1962); (a) p. 135; (b) pp. 101, 126-127.
- (9) Gamson, W. A.: The fluoridation dialogue: Is it an ideological conflict? *Public Opinion Quart* 25: 526-537 (1961).
- (10) Simmel, A.: A signpost for research on fluoridation conflicts: The concept of relative deprivation. *J Soc Issues* 17: 26-36 (1961).
- (11) Mausner, B., and Mausner, J.: A study of the anti-scientific attitude. *Sci Amer* 192: 35-39 (1955).
- (12) Kirscht, J. P., and Knutson, A. L.: Fluoridation and the "threat" of science. *J Health Hum Behav* 4: 129-135 (1963).
- (13) Metz, A. S.: An analysis of some determinants of attitude toward fluoridation. *Soc Forces* 44: 477-484 (1966).

Hospital Electrical Facilities. *PHS Publication No. 930-D-16; 1969; 36 pages; 50 cents.* Gives guidelines for installation of the latest electrical systems in the construction of hospital and health facilities. The 1969 revision reflects changes in current practices, provides up-to-date references to applicable codes and standards, and recommends design practices that will provide optimum hospital electrical system facilities.

Manual of Tests for Syphilis, 1969. *PHS Publication No. 411; revised; 81 pages; \$3.* Assembles technical procedures for tests for syphilis that are most widely used and have been published previously in reputable journals and adequately evaluated. Includes darkfield microscopy, FTA-ABS test, RPR (circle) card test, USR test, and VDRL slide tests. Also includes an addendum which lists the less widely used tests, incompletely evaluated and experimental procedures, and tests of historical interest. Contains an appendix with sections on collecting and processing specimens, equipment and glassware, preparation of control serums, check testing of antigens and other reagents, and total protein determination on spinal fluid specimens.

Regulations, Standards, and Guides for Microwaves, Ultraviolet Radiation, and Radiation From Lasers and Television Receivers. An annotated bibliography. *PHS Publication No. 999-RH-35. By Lloyd R. Setter, David R. Snavelly, Duane L. Solem, and Rodman F. Van Wye; April 1969; 77 pages.* Presents an annotated bibliography of guidelines, standards, and regulations pertain-

ing to public health protection against electromagnetic radiation from television receivers, lasers, ultraviolet radiation, and microwaves. Designates the annotated documents as Class A (established or adopted by a governmental body acting under the authority of an act, law, or statute), Class B (adopted by consensus of a committee or commission of technical competence in standards-setting organizations), and Class C (not adopted by a standards-setting organization, but contains information pertinent to the preparation of suitable standards or regulations). Annotations include identification of the documents, type of standard, intended compiler, intended benefiter, limits and specifications, and general guidance.

Smoking and Health Experiments, Demonstrations, and Exhibits. *PHS Publication No. 1843; 1968; 21 pages; 20 cents.* Contains materials compiled from various teachers' guides. Presented in three parts, Part I illustrates experiments, most of which require some kind of laboratory equipment. Students should consult with science teacher or adviser before attempting the more complicated demonstrations. Part II includes demonstrations which can be performed by one or two persons. Part III contains suggestions for exhibits.

Utilization of Psychiatric Facilities by Children: Current status, trends, implications. *PHS Publication No. 1868; 1968; 77 pages; 75 cents.* Offers extensive data on the age, sex, diagnosis, and other characteristics of children cared for at outpatient psychiatric clinics, State and county

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Current Research in Chronic Respiratory Disease. Proceedings of the Eleventh Aspen Emphysema Conference. *PHS Publication No. 1879; 1968; 355 pages; \$2.25.* Presents reports, abstracts, and discussions of the conference at Aspen, Colo., June 12-15, 1968. Topics included cell biology, physiology, vascular studies, pathology, lung morphology, epidemiology, and special physiology.

Current Research in Chronic Obstructive Lung Disease. Proceedings of the Tenth Aspen Emphysema Conference. *PHS Publication No. 1787; 1968; 531 pages; \$2.75.* Includes reports on major pulmonary research findings in the United States and abroad that were discussed at the conference in Aspen, Colo., June 7-10, 1967. Subjects covered are airways function, gas transport, vascular studies, bronchial hyperactivity, morphology, and physiology techniques.

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