

Motivational and Behavioral Effects of Modifying Health Beliefs

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IT has long been known that people's beliefs, values, and traditions may be antithetical to their seeking health services, even when the services are accessible and effective. Moreover, it is also known that a great many people do not voluntarily enter the professional health care system as clients until they are confronted with disabling symptoms, and yet the greatest potential contributions of the health professions are to prevent disease or to detect and treat it in an early presymptomatic stage.

Finally, interest must be directed not only to persuading potential clients to enter the professional health care system before symptoms appear, but also to educate them to adopt certain personal health practices which it is believed will reduce the probability of premature serious illness. For these reasons it is important to understand why people currently engage in the health practices they do and to experiment with methods for systematically modifying these bases for behavior.

While progress has been made in understanding why people do or do not take health actions, much remains to be done. The psychosocial literature on health behavior has been

extensively reviewed by Kasl and Cobb (1). They concluded that the "health belief model" formulated by Hochbaum, Rosenstock, Kegeles, and their associates is the best explanation yet offered for health behavior undertaken by a person with no symptoms. The health belief model is a cognitive formulation which has the following key elements.

1. The extent to which people believe they are susceptible to a disease.
2. How serious people think that occurrence of the disease would be.
3. How beneficial people believe certain actions would be in reducing their susceptibility to or severity of the condition in the light of any barriers to taking the actions.

Rosenstock (2) reviewed in detail the components of this theory and the empirical support for it. Although several studies have yielded findings consonant with the model, various difficulties are associated with most of them. Data for all the studies he reviewed were obtained through nonexperimental surveys and are subject to the limitations of that approach. The majority of the studies were retrospective—one cannot be certain whether holding the health beliefs preceded taking action rather than vice-versa. Of the few prospective studies cited by Rosenstock, two yielded positive results and one negative results concerning the predictive role of the variables in the model. In addition, questions as to how the beliefs are acquired and whether and how they may be altered also re-

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main to be answered. Rosenstock acknowledged the tentativeness of the findings up to 1966 and emphasized the need for experimental research to test more definitively the causal role of the health beliefs in influencing health behavior.

A recent study by Kegeles (3) attempted such a test, by using a field experiment conducted among a low-income ghetto population. Numerous circumstances interfered with the conduct of the study as planned (4). Consequently, the study findings, while generally consonant with the health belief formulation, are not conclusive.

This study was an effort to collect experimental data on the health belief model. A laboratory setting was selected to make it possible to clarify the relationships between initial beliefs, experimental treatments, subsequent beliefs, intentions to act, and behavior.

Method

The study entailed investigating the effects of exposure to separate films on heart disease, cancer, and tuberculosis. Viewers were queried about their emotional reactions, beliefs concerning disease, intentions to take health-related actions, and behavior. Persons were randomly assigned to three experimental groups and a control group. Each experimental group was shown a different film on 3 successive days. The films were presented in different orders.

Films. The films, produced by health agencies for use in public educational campaigns, were edited to approximately 18 minutes each. Each film contained material concerning the nature and prevalence of a disease, its consequences, and actions that could be taken to prevent it.

The film on cancer described the seven danger signals of cancer and recounted case histories of persons who sought medical help and of others who did not. It emphasized the importance of regular medical checkups.

The film on heart disease depicted an all-day family outing that culminated in a heart attack for the head of the family. It stressed the desirability of regular medical checkups plus such actions as regulation of diet, proper exercise, and not smoking.

The film about tuberculosis described the current status of treatment of that disease and included portrayal of a surgical operation for

removal of a tuberculous lung. It advocated regular medical checkups and chest X-rays.

Thus, two of the films—those on cancer and tuberculosis—emphasized the desirability of seeking regular professional examination while the third—the film on heart disease—recommended both professional examination and the adoption of certain personal health practices.

Participants. One hundred and sixty-six nonacademic university employees participated in the experiment. Data on four other persons who missed one or more sessions were disregarded. The participants were paid volunteers, recruited by mail from a directory of university employees. The recruitment letter indicated that a public health research unit of the university was conducting the study to learn more about people's knowledge and beliefs about health and in particular to obtain reactions to films developed for public education on such topics.

Participants ranged in age from 18 to 68 years, with a median age of approximately 35 years. Most were high school graduates; less than 20 percent had a college degree. A large majority (86 percent) were women employed in secretarial and clerical positions.

Procedure. One week before the film sessions, all participants completed a questionnaire on their beliefs about health and illness and about past health-related actions they had taken. During the film sessions, conducted on 3 successive days, the experimental groups were first shown a health film and immediately afterward asked to complete a questionnaire dealing with emotion aroused by that film and beliefs concerning various diseases, including the one depicted in the film.

Each group saw the films in different order. After seeing the third film, the viewers answered additional questions about their intention to take various health-related actions. The control group, which did not view any films, met at the same times, worked on tasks unrelated to the film topics, and, except for items pertaining to the degree of emotional arousal produced by the films, answered the same questions as the experimental groups.

Approximately 8 months after the films were shown, a questionnaire on health-related behavior subsequent to seeing the films was sent unannounced to all study participants. The ques-

tionnaire was completed and returned by 135, or 81 percent, of the participants. Of these, 102 had been in the experimental groups, and 33 had been in the control group. Of the remaining 19 percent, the majority had left the university's employ without providing a forwarding address and therefore could not be located by the investigators.

Measures. Both the emotional responses aroused by the films and the participants' appraisals of their susceptibility to the disease, the severity of the disease, and the efficacy and ease of taking various preventive actions were measured by questionnaire items with 7-point rating scales ranging from 0 (low) to 6 (high). Besides these basic measures, designed to reflect the individual components of the health belief model, the data were combined in various ways to construct two indices.

1. Index of potential threat of the disease—derived by multiplying the susceptibility score for each person by his severity score, then extracting the square root of that product. Scores on this index had a possible range from a low of 0 to a high of 6.

2. Index of overall belief—derived by multiplying the potential threat score for each person by his score for perceived efficacy of taking preventive action. Since the scores on potential threat and on efficacy each ranged from 0 to 6, scores on overall belief had a possible range from 0 to 36. The index of overall belief was intended to represent the person's readiness to take action as suggested by the health belief model.

In summary, the study permitted assessment of health belief changes occurring as a result of threatening communications and the relationship of the beliefs, both singly and in combination, to a variety of intended actions and to reported behavior subsequent to the communication situation.

Results

Initial levels of beliefs about illnesses. Before viewing the films, the participants perceived cancer as a greater potential threat to health than heart disease or tuberculosis. Cancer was rated highest in severity and just below heart disease in perceived susceptibility. Cancer was also rated lowest in general beliefs in the

benefits of taking health actions. Heart disease was also viewed as relatively threatening, but the efficacy of preventive measures was perceived as relatively high. Tuberculosis initially presented the lowest perceived threat. It was lowest of the three diseases in perceived susceptibility and severity, and highest in perceived benefits of preventive actions.

All the protective actions against the three diseases were rated by respondents as relatively easy to take if they so desired. The two medical actions, going to a physician for a checkup and obtaining an X-ray, were regarded as easier than altering personal living habits, with one exception: Taking vitamin pills was rated as the easiest action of all. Limiting caloric intake was rated as relatively the most difficult thing to do.

Analyses of combinations of belief measures yielded the following findings. On the index of potential threat (combined views regarding susceptibility and severity), the mean score for cancer was slightly higher than that for heart disease, while tuberculosis lagged far behind (table 1).

When perceived efficacy was introduced into the combination in order to derive overall belief index scores associated with a given disease, the differences became more clearcut. The mean scores for this measure were cancer 11.17, heart disease 13.39, and tuberculosis 9.93 (table 1). This differentiation reflects the fact that although cancer and heart disease were seen as similarly threatening, respondents were more likely to think that they could do something to prevent heart disease.

Table 1. Mean potential threat scores and overall belief scores before viewing the films, by disease

Disease	Potential threat ^{1,2}	Potential benefits of actions ²	Overall belief ³
Cancer.....	3.65	3.06	11.17
Heart.....	3.56	3.76	13.39
Tuberculosis.....	2.58	3.85	9.93

¹ Potential threat=square root of the product of susceptibility and severity.

² Possible scores range from 0 to 6, with 6 high.

³ Overall belief=potential threat×belief in benefits.

Demographic correlates of initial beliefs and behavior. Attempts to relate patterns of initial health beliefs and behaviors to the standard demographic variables of age, sex, and education yielded only scattered significant results. Education had a low negative relationship to perceived susceptibility to tuberculosis and a low positive relationship to perceived severity of heart disease, but all its other correlations with health beliefs were extremely small and not statistically significant. Education also showed little relationship to past health-related behavior, except for a positive association with reported medical checkups.

The fact that 86 percent of all the participants were women attenuated comparisons by sex. Few differences in belief between men and women appeared; the only consistent difference was that women believed that all three diseases were more severe than men.

Age yielded a few significant relationships. It was positively related to perceived susceptibility to and seriousness of cancer and to perceived seriousness of tuberculosis. As with education, age showed little relationship to past health-related behavior, with one exception: a positive association was found between age and restricting caloric intake.

The occurrence of significant relationships between demographic characteristics and reports of health beliefs and past behavior was substantially lower than in previous studies (5-7). However, because the vast majority of participants in this study were women in secretarial-clerical occupations, their relative homogeneity may well have restricted the correlations.

Changes in health beliefs after viewing the films. The participants' beliefs concerning their susceptibility to a given illness were consistently altered by viewing a film on that disease. For each disease, the experimental group who had just viewed a film about it scored higher on perceived susceptibility than the control group. Of the nine individual comparisons thus made, all were in the predicted direction, with four achieving statistical significance.

In contrast, little change in the perceived seriousness of the various threats to health

occurred following the films; no systematic trends appeared for this variable. All three diseases were initially seen as quite severe, with heart disease and cancer especially so; all three are also well known. Some less severe conditions—influenza and tooth decay—were also the subject of questionnaire items. Estimates of the severity of influenza and tooth decay increased over the course of the experiment, suggesting that tuberculosis, heart disease, and cancer were near enough a measurement ceiling initially to preclude upward change.

Perceived benefits of taking various actions to prevent a threat to health were modified by the films. The experimental group who had just seen a particular film consistently rated the efficacy of various actions more favorably than the control group. This finding held true for a general question referring to all that the respondent felt might reasonably be done and also for items dealing with specific protective actions.

Some unanticipated findings concerning perceived benefits were also obtained. Not only did a film increase the degree of perceived benefits of the actions it advocated, but it also influenced perceived benefits of other actions never mentioned in the film. For example, belief that modifying one's diet would be efficacious in preventing tuberculosis increased significantly after showing of the film about tuberculosis, although that film never mentioned diet. Furthermore, actions recommended as beneficial in connection with a given disease—for example, exercise in relation to heart disease—also increased in their perceived benefit for reducing other threats to health, including health problems not mentioned in the films.

Such findings are consistent with the theoretical view advanced by Janis (8) that moderate threats (including most threats short of impending disaster) lead people to seek a state of balance between fear responses and reassurance. Our results suggest that persons placed in a fear-evoking situation may actively seek added reassurance rather than merely assimilate that which is offered. These findings also suggest that under conditions of threat recommended actions are applied beyond their spe-

cific context; something regarded as effective for one condition increases in generality.

Index measures of health beliefs. The potential threat value ($\sqrt{\text{susceptibility} \times \text{severity}}$) of each disease was increased by viewing a film concerning it (table 2). The increases shown by the experimental groups were generally higher than those shown by the control group, although not always yielding a statistically significant difference. The overall belief index scores (potential threat \times benefits) of the diseases were influenced even more markedly by the health films (table 2). This was due to the fact that the films increased perceived benefits of protective actions at the same time that they increased potential threat value of the diseases.

From the various findings reported in this section, it is clear that the health films significantly modified beliefs in perceived susceptibility and benefits. Also modified were indices constructed from various health belief combinations. In each instance, persons in the experimental groups were affected more than those in the control group.

Intentions. Persons exposed to the health films were compared with the control group on intentions to take the various preventive actions mentioned in the films. Compared with those in the control group, persons who had viewed the films significantly more often reported intentions to obtain X-rays, make visits to a physician for a checkup, engage in regular exercise, and reduce the amount of fatty foods in their diet.

After the experimental groups had seen the films, the relationship of their belief scores to their intentions to obtain a medical checkup was

Table 2. Mean scores on potential threat and overall belief in experimental and control groups after the films were shown, by disease

Disease	Potential threat		Overall belief	
	Experimental	Control	Experimental	Control
Cancer.....	3.80	3.50	14.25	10.85
Heart.....	3.65	3.39	14.96	12.78
Tuberculosis..	3.27	2.67	12.52	9.45

ascertained. The groups' overall beliefs regarding cancer, heart disease, and tuberculosis were classified and assigned numerical values: low—0, medium—1, and high—2. A combined distribution was created by summing over the three diseases. This distribution was then divided into low and high as near the median as possible. Overall belief scores were significantly related to intention to obtain a medical checkup.

Strength of intention to obtain checkup	Overall belief score ¹		
	Low	High	Total
High.....	41	39	80
Low.....	37	13	50

¹ $\chi^2 = 6.64$, $P < 0.01$, 1 d.f.

Overall health belief scores and potential threat scores for heart disease and tuberculosis were significantly related to intentions to change certain living habits, for example, intention to restrict caloric intake. Overall belief scores for cancer—but not potential threat scores—were significantly related to intentions to obtain a checkup by a physician.

Subsequent health behavior. A recommended medical action common to all three films was making regular visits to a physician for a checkup in the absence of symptoms. The actions listed in the table were reported 8 months later by the percentages of respondents shown.

Action	Experimental (N=102)	Control (N=33)
Checkup.....	57	39
X-ray in absence of symptoms.....	21	12
Had symptoms, visited physician.....	52	52

Persons in the experimental groups when questioned 8 months later reported having had a checkup in the interim significantly more often than those in the control group. A similar but not statistically reliable difference was found for persons obtaining a chest X-ray.

As expected, no difference was found in visiting a physician when the respondent had symptoms. Illness patterns and practices were not expected to be influenced by the experiment.

One set of analyses dealt with health belief scores immediately after seeing the film series in relation to subsequent health actions. For one comparison, scores on the overall health belief index for each participant were summed over

cancer, heart disease, and tuberculosis. As predicted from the health belief model, persons with higher belief scores were more likely to have a checkup.

Medical checkup	Overall belief score ¹		
	Low	High	Total
Yes-----	32	45	67
No-----	35	18	63

¹ $\chi^2=7.56, P<0.01, 1 \text{ d.f.}$

Additional analyses focused on overall health beliefs about individual diseases. For cancer and heart disease, overall beliefs showed a significant positive relationship to health action (cancer, $\chi^2=5.17, P<0.05, 1 \text{ d.f.}$; heart disease, $\chi^2=4.39, P<0.05, 1 \text{ d.f.}$). The result for tuberculosis was in the same direction but failed to attain statistical reliability.

In contrast to the findings concerning medical actions, the experimental and control groups showed no significant differences on the follow-up survey with respect to behaviors involving personal living habits. In addition, analyses of overall health belief scores as related to personal living habits yielded no significant relationship. Apparently, then, effectiveness of the beliefs about health in modifying behavior is specific to the kind of behavior proposed. The medical actions required periodic behavior that would interfere only occasionally with established behavior patterns of the participants. The actions involving personal living habits, however, involved altering presumably well-established and frequently repeated patterns of action. For modifying such actions, merely changing the participants' beliefs about health was not enough.

Conclusions

The setting in which this study was conducted permits an answer to certain aspects of the relationships between health belief model variables and health behavior. It was demonstrably possible to modify systematically beliefs concerning one's susceptibility to each of several conditions, and the effectiveness of various actions to prevent or ameliorate the conditions. The changes in belief resulted in increased intentions to take pertinent health-related actions. Generally, these intentions were related positively to reported subsequent actions. Such findings

are clearly consonant with the health belief model.

Apparently, however, the nature of the action itself is important in determining the actual performance. Increasing the belief in the desirability of a checkup for disease prevention appears sufficient for many people to take the action. Their motivation is closely correlated with cognitive factors.

In contrast, personal practices, such as dietary patterns and other long-established habits, were not markedly influenced by the changes in belief induced by the films. Probably habits and long-established behavioral patterns engage many motives that include but go beyond health care. Altering one's beliefs about health may be sufficient to change actions that are largely motivated by health matters but will usually be insufficient to alter behaviors that simultaneously satisfy a variety of motives.

The findings from the experiment discussed in this paper, while providing support for the explanatory value of the health belief model under more rigorous conditions than have been employed heretofore, represent the outcome of but a single study. More research on this subject is clearly in order. Several important questions concerning the health belief model were beyond the scope of a single study and await answers through future research. Such subjects as the optimal ways of conceptualizing, measuring, and modifying these variables warrant further investigation if the health belief model is to be an effective tool, not only for understanding and predicting, but also for changing health-related behavior.

Through such research, a mechanism would be suggested for inducing substantial numbers of people to enter the health care system at an earlier stage than they now do. However, still other efforts would be needed to develop means for influencing personal practices that are habitual or that are determined by a cluster of motivational forces.

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Tearsheet Requests

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1969 Hospital Expenses Increased

In 1969, the total expenses for the nation's 5,820 community hospitals increased 17.2 percent, according to a recent release of the American Hospital Association. The higher cost of supplies and equipment in that year caused this category of hospital expenses to increase at a faster rate than the cost of personnel, always the largest hospital expense.

Hospitals have been experiencing increases in expenses of 13 to 16 percent a year since 1966. The AHA had announced that increases of about 15 percent could be expected through 1971 as the hospitals' wage scales catch up with other industries in the community.

In the March 16 issue of *Hospitals*, the monthly feature "Hospital Indicators" reported on the 1969 experience and showed total expenses of \$17.2 billion, or \$2.5 billion higher than 1968. The cost of hospital supplies, facilities, and equipment increased by 26 percent and the cost of personnel increased by 11.9 percent.

"Hospital Indicators" is based on data from a sample of 664 hospitals selected from a universe of 5,820 short-term general and other special hospitals—also called community hospitals—registered by AHA. This represents 81.5 percent of all hospitals, 48.5 percent of all beds, and 91.5 percent of all admissions among registered hospitals in the United States.

The cost of goods and services purchased by community hospitals increased from \$5.5 billion in 1968 to \$6.9 billion in 1969, and in

the same year the cost of personnel increased from \$9.2 billion to \$10.3 billion.

The fastest growing service in hospitals is the outpatient department. In 1969 the nation's community hospitals reported 118 million outpatient visits, a 6.6 percent increase over the 1968 total of 111 million. Inpatient days increased only 1.3 percent over 1968.

Adjusted patient days showed an increase of 1.5 percent—from 248 million in 1968 to 252 million in 1969. Adjusted patient days represent the sum of inpatient days and outpatient visits as equivalent inpatient days. For 1969 the expense per adjusted patient day was \$68.41, or \$9.15 higher than in 1968.

Admissions to community hospitals totaled 28.4 million, or an increase of 2.1 percent over 1968. Since 1966 the largest increase in admissions each year has been for Medicare patients—in 1969 Medicare admissions increased 6.1 percent. For patients under 65 years of age, there was a 1.1 percent increase in admissions in 1969.

The average length of stay for all patients was 8.1 days, the same as in 1968. As reported previously, the Medicare patients stayed in the hospital longer than other patients. In 1969 the group 65 years and older averaged 13 days per stay; in 1968 it was 13.4 days.

Persons employed in the 5,820 community hospitals increased by 100,818 in 1969 for a total of 1,812,522.