RELATIVELY LOW LEVELS of public participation in screening, immunization, and other preventive health programs have been extensively documented,21, 50, 55, 91 as have the generally poor rates of individual compliance with prescribed medical therapies.42, 52, 81, 86 Over the past two decades, hundreds of research reports and review articles have been published reflecting the desire to both discover and better understand the determinants of voluntary health-related actions. Emphases range from medical3, 19 and economic88, 97 considerations to dimensions which are mainly demographic,4 socioeconomic,58 sociocultural,60, 84, 90, 107 personal and motivational,1, 13, 95 organizational,11, 45 geographic,28, 99 and social-interactive.25, 79, 85 Many eclectic reviews of research on health, illness, and sick-role behaviors have summarized findings across all or most of these perspectives.3, 26, 63, 64, 78

In its attempt to systematically summarize this vast literature, the Carnegie Grant Subcommittee on Modification of Patient Behavior for Health Maintenance and Disease Control examined various extant formulations that have been advanced to explain health actions, most notably the frameworks of Kasl and Cobb,63 Kosa and Robertson,73 Suchman,101 Mechanic,83 Fabrega,38 Andersen,3 Anderson and Bartkus,5 and Rosenstock and associates.10, 95 These models are briefly detailed in Table 1, and have been compared by Kirscht.69 The Subcommittee decided to use the Health Belief Model as an organizing rubric, for several reasons. First, the model variables provide potentially intervenable (i.e., modifiable)68 links between the demographic, background, and resource variables of the other models and ultimate utilization of health and medical care services. Second, the model’s core dimensions are derived from a well-established body of psychological and behavioral theory, particularly the work of Lewin.27 Its focus on the valence of a goal, subjective probability of attainment, and motivation make it similar to other models of decision-making under uncertainty,80 such as the theories of Tolman,104 Rotter,98 Edwards,36 Atkinson,
### Table 1. Selected Models of Health-Related Behaviors*

<table>
<thead>
<tr>
<th>Model</th>
<th>Predicted Variables</th>
<th>Predictors</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kasl and Cobb^{63}</td>
<td>Likelihood of a specific behavior in presence of symptoms.</td>
<td>Proximal-Pain and discomfort of symptoms as mediated by threat, value of actions, and psychological distress. Distal-Social characteristics, personal tolerance for pain, disability, coping mechanics.</td>
<td>Threat components include perceived importance of health, susceptibility to illness, severity of consequences. Value components include probability of action leading to desired results, cost of action vs. cost of inaction.</td>
</tr>
<tr>
<td>Kosa anad Robertson^{73}</td>
<td>All health and illness behavior (therapeutic and gratificatory actions are distinguished).</td>
<td>Disturbances or threat assessment as symptoms. Anxiety arousal (motive). Assessment of disturbance (these are structured by culture, situation, and interaction patterns).</td>
<td>Assessment of symptoms = threat. Assessment of disturbance includes classifying the episode, its potential effects and actions to deal with it. This is a process model with stages, organized around the episode as a unit.</td>
</tr>
<tr>
<td>Suchman^{101}</td>
<td>Use of medical care systems for illness episode. Specific behaviors relate to the stage of illness (symptoms, sick role, medical contact, patient role, recovery).</td>
<td>Social group structure-integration, cohesion, ethnocentrism (parochial vs. cosmopolitan). Health orientation-popular vs. scientific medical beliefs.</td>
<td>Beliefs about threat and actions to take depend on group structure and health orientation. Structure and orientation are clearly related and tied to SES and ethnic group.</td>
</tr>
<tr>
<td>Andersen^{3}</td>
<td>Medical care utilization.</td>
<td>Individual determinants: Predisposing (prospensity to use services) includes demographics, social structural, beliefs. Enabling (conditions permitting action) include family and community resources. Illness level (perceived) include disability, symptoms, diagnoses.</td>
<td>Predisposing beliefs are general (values re: health and illness, attitudes to health services, and knowledge re: disease). Perceived illness level apparently involves beliefs. Actual use of services is a function of the three components, but the functions will vary by type of service.</td>
</tr>
</tbody>
</table>
Table 1. (continued)

|----------------------------|----------------------------------------|-------------------------------------------------|-------------------------------------------------|

\(^6\) After Kirscht.\(^9\)

and Feather.\(^3\)\(^9\) This type of "value-expectancy" approach has been applied productively in the area of smoking behavior.\(^8\)\(^2\) Third, while the Model was originally developed to account for preventive health actions,\(^5\) it has been employed to explain illness\(^6\)\(^3\) and sick-role\(^1\)\(^2\) behaviors as well. Indeed, as a decision model, the health belief approach should be applicable to a variety of dependent variables, including actions to relieve psychological distress. Fourth, analogies to the model's health belief variables may be found in the other models. For example, both Kasl and Cobb, and Kosa and Robertson view the occurrence of symptoms as representing a threat to the individual; Suchman's model includes health beliefs (including general confidence in doctors and medical care) evoked as the person progresses through the stages of illness, and as determining further stages; and Mechanic's study stresses differential perception of symptoms and severity. In Andersen's model, health beliefs are part of a set of predisposing factors affecting use of health services, while Anderson and Bartkus employ perceptions of symptoms and various sociodemographic factors as perceptions of the value of an action. Fifth, most of the additional variables in the other models (e.g., "enabling factors," demographic and social characteristics, previous health care experiences) can be subsumed under the "modifying and enabling" categories of a recently-expanded and reformulated version of the Health Belief Model.\(^1\)\(^7\)

**The Health Belief Model**

As it was originally conceived, the Health Belief Model hypothesized that persons will generally not seek preventive care or health screening unless they possess minimal levels of relevant health motivation and knowledge, view themselves as potentially vulnerable and the condition as threatening, are convinced of the efficacy of intervention, and see few difficulties in undertaking the recommended action.\(^9\)\(^3\)

Specifically, the model contains the following elements (Fig. 1):

1. The individual's subjective state of readiness to take action, which is determined by both the individual's perceived likelihood of **susceptibility** to the particular illness and by his or her perceptions of the probable **severity** of the consequences (organic and social) of contracting the disease.
2. The individual's evaluation of the advocated health behavior in terms of its feasibility and efficaciousness (i.e., an estimate of the action's potential benefits in reducing susceptibility and/or severity), weighed against his perceptions of physical, psychological, financial, and other costs or barriers involved in the proposed action.

3. A cue to action must occur to trigger the appropriate health behavior; this stimulus can be either internal (e.g., symptoms) or external (e.g., interpersonal interactions, mass media communications). Although it is assumed that diverse demographic, personal, structural, and social factors can, in any given instance, affect an individual's health motivations and perceptions, these variables are not considered as direct causes of health action.

Because the perceptions and beliefs which make up the Health Belief Model (HBM) have been demonstrated to be alterable, findings related to this formulation have considerable potential for application. By knowing which HBM components are below a level presumed necessary for behavior to occur, the health worker might be able to tailor intervention to suit the particular needs of the target group or population. The following discussion reviews evidence for and against the HBM, and suggests areas for further activity and research.

Preventive Health Behavior

Although many recent investigations have identified explanatory variables that are similar to one or another of the HBM variables, seven major projects were originally undertaken with designs largely or entirely determined by the model. Of these, four
were retrospective studies and three were prospective. In the retrospective research projects, data about respondents’ beliefs and behavior were gathered during the same interview, with the questionable assumption that the beliefs existed at a point in time prior to the behavior. Also, with the exception of the Hochbaum study and the National Study of Health Attitudes and Behavior, the research was based on relatively small samples. Finally, the concept of motivation, now considered central to the HBM, was not specifically studied in these early investigations.

Hochbaum studied more than 1,200 adults in three cities in an attempt to identify factors underlying the decision to obtain a chest x-ray for the detection of tuberculosis. He measured respondents’ beliefs in both susceptibility to tuberculosis and in benefits of early detection. Perceived susceptibility to tuberculosis contained two elements: 1) the respondent’s beliefs about whether tuberculosis was a real possibility in his case; and 2) the extent to which he accepted the fact that one may have tuberculosis in the absence of all symptoms. Taking first the findings for the group of persons that exhibited both beliefs, 82 per cent had obtained at least one voluntary chest x-ray during a specified period preceding the interview. On the other hand, of the group exhibiting neither of these beliefs, only 21 per cent had obtained a voluntary x-ray during the criterion period. Thus, four out of five people who exhibited both beliefs took the predicted action, while four out of five people who accepted neither of the beliefs did not. Hochbaum had demonstrated, with considerable precision, that a particular health action is largely a function of the two interacting variables “perceived susceptibility” and “perceived benefits.”

Kegeles dealt with conditions under which members of a prepaid dental care plan come in for preventive dental checkups or prophylaxis in the absence of symptoms. The study attempted to measure the respondent’s perceived susceptibility to a variety of dental diseases, the perceived severity of these conditions, his beliefs about the benefits of preventive action, and his perceptions of barriers to those actions. Kegeles’ findings support the importance of the HBM variables, although their general applicability is limited by a substantial loss in the sample ultimately available for analysis.

The findings of the remaining retrospective studies are not presented in detail here, but are in most respects quite similar to the two reviewed above. In each case, evidence supporting the model was obtained, although the sample sizes were not large.

In summary, although no one of the original studies provided complete confirmation of the HBM, each produced internally consistent findings which were in the predicted direction; taken together, they thus provided reasonably strong support for the model. However, because of the problems and limitations of retrospective research, a two-phase study was needed in which beliefs would be identified at one point in time, and behavior measured later.

Such a study was undertaken in 1957; it centered upon the impact of the threat of Asian influenza on families. As one of a series of related studies, 200 randomly selected respondents in each of two medium-sized cities in the United States were interviewed twice. It was intended that the first interview be conducted before most people had the opportunity to seek vaccination or to take any other preventive action, and before much influenza-like illness had occurred in the communities. The second interview was to be made after all available evidence indicated that the epidemic had subsided.

In fact, only partial success was achieved in satisfying these conditions, as both the
epidemic and the community vaccination programs progressed faster than had been anticipated. For these reasons, the sample on which the test could be made was reduced to 86 respondents who, at the time of initial interview, had neither taken preventive action relative to influenza nor had experienced influenza-like illness in themselves or in other members of their families. Twelve of the 86 scored relatively high on a combination of belief in their own susceptibility to influenza and in the severity of the disease.

Five of these 12 subsequently made preventive preparations relative to influenza. However, at the time of the first interview, the remaining 74 persons rejected either their own susceptibility to the disease or its severity, or both. Of these, only 8, or 11 per cent, subsequently made preparations relative to influenza. Although the samples on whom comparable data could be obtained were very small and possibly not representative, the differences were statistically significant. Analyses of the available data thus suggest that prior beliefs in susceptibility and severity are instrumental in determining subsequent action.

A second prospective study was done by Kegeles67 as a follow-up of the study reported earlier.66 Three years after the initial collection of data on a sample of more than 400 in 1958, a questionnaire was mailed to each person in the sample, as well as to a comparable control group, to obtain information about the three most recent dental visits. The research objective was to determine whether beliefs identified in the original study were associated with behavior during the subsequent three-year period.

Kegeles found that perceptions of seriousness, whether considered independently or together with other variables, were not associated with subsequent behavior. Also, beliefs in benefits, when taken alone, were not significantly related to subsequent behavior. However, perception of susceptibility was correlated with making subsequent preventive dental visits. Of those who had earlier seen themselves as susceptible, 58 per cent made subsequent preventive dental visits while 42 per cent who had not accepted their susceptibility made such visits. Also, when beliefs about susceptibility and benefits were combined, a more accurate prediction was possible of who would or would not make preventive dental visits.

However, another major investigation conflicted in most respects with the findings of the earlier studies. The study50, 71 included analyses of beliefs and behavior of a probability sample of nearly 1,500 American adults taken in 1963, and the subsequent behavior of a 50 per cent subsample studied 15 months later. Perceived susceptibility, severity, and benefits, whether taken singly or in combination, did not account for a major portion of the variance in subsequent preventive and diagnostic behaviors. It is important to note that, in all the prior studies, the population had been exposed to information which indicated the availability of a health procedure and which, in most cases, also urged them to avail themselves of that procedure. In contrast, such conditions did not occur for the sample in the most recent national study. Thus, the absence of clear-cut cues to stimulate action, together with unequal opportunity to act may in large measure account for the failure to replicate the earlier results.

Two more recent studies lend further support to the general explanatory model of health behavior; in these instances, the specific HBM variables have been treated more innovatively than in earlier research. Haefner and Kirscht51 attempted experimentally to increase people's readiness to follow preventive health practices by presenting them with communications about selected health problems. These messages
were intended to increase both perceived susceptibility and/or severity regarding the health problems, and beliefs in the efficacy of professionally recommended behavior. Significantly more persons exposed to such messages visited a physician for a checkup (in the absence of symptoms) in the eight months after the experimental manipulation than in a control group not exposed to the messages. Becker et al.\textsuperscript{16} have applied the HBM to the area of genetic screening. Beginning in 1971, an identified Jewish population in the Baltimore-Washington area was invited to participate in screening for the Tay-Sachs trait. Because this relatively rare disease and the diagnostic test were largely unknown to the lay public, it is a reasonable inference that the majority of persons studied had little contact with the disease, with screening, or with amniocentesis, and that they held few relevant beliefs about it prior to the program.

The explanatory variables were defined as follows: \textit{Health motive} was for the second time\textsuperscript{12} explicitly introduced into the model. In this study, motive included two components: 1) a desire to have (additional) children; and 2) a set of generalized items about typical health behavior, such as the frequency with which the person thinks about his own health and whether he generally goes to a physician right away if he feels sick. \textit{Perceived susceptibility} included the person's belief that he could carry the Tay-Sachs gene and transmit it to his progeny. \textit{Severity} was interpreted as the individual's views of the potential impact of learning that he was a carrier, especially as regards future family planning. The definition of \textit{perceived benefits} was in terms of a personal evaluation of how much good it would do a potential carrier to be screened for the trait; did he really need to know (or want to know) his carrier status? \textit{Barriers to action} were not directly measured in this study; they might include monetary or convenience factors, as well as threats we currently know very little about: the impact on an individual of learning that he is a carrier of some recessive trait, and its affects on self-image, marriage, and perceptions of health and well being.

All adults who appeared for screening were asked to complete a brief questionnaire just before going through the screening process; 500 of these were selected at random as the sample of participants. In addition, 500 questionnaires were mailed to a random sample of nonparticipants who had also been invited in for screening. It should be noted that everyone studied had received intensive information material on Tay-Sachs disease and screening before the program began.

The groups differed sharply in the first component of health motivation; 82 per cent of those who expressed a desire to have future children participated in the screening program, while less than 19 per cent without this desire participated. Also, perceived susceptibility to being a carrier was highly correlated with participating in the screening program, while perceived severity was negatively associated with participation. Apparently, perceived severity associated with the Tay-Sachs trait reached such high levels as to become dysfunctional (a similar phenomenon was observed in Hochbaum's\textsuperscript{56, 57} original study). Further examination of findings from other studies suggests that, for the asymptomatic individual, very low levels of perceived severity are not sufficiently motivating, while very high levels of perceived seriousness (including fear) are inhibiting\textsuperscript{58, 59, 74}; thus, both extremes are associated with low likelihood of taking preventive health action. Leventhal \textit{et al.}\textsuperscript{76} have concluded that, once a person has reached some subjective threshold of fearfulness, it is doubtful that any attempt to increase perceived severity will lead to further acceptance of health recommendations. This view parallels results from
earlier studies of delay in seeking examinations for cancer,\textsuperscript{20} which demonstrate that individuals who believe learning of a negative health state would be personally highly disruptive tend to avoid screening.

**Additional Evidence**

Other studies of preventive health behavior have included one or another of the HBM variables, sometimes as an incidental part of the design.

In an early analysis of public response to polio vaccinations, a review\textsuperscript{96} of several independent investigations concluded that perceived susceptibility, severity, and costs and benefits (safety and effectiveness of the vaccine) accounted for major portions of the variance in participation.

In a study by Heinzelmann and Bagley\textsuperscript{54} of reasons for participation in physical activity programs, the two most important reasons given were the desire to feel better and to lessen the chance of a heart attack. Indeed, one of the major perceptual outcomes of participation was a feeling of decreased vulnerability to specific health threats, including heart attacks.

Fink et al.\textsuperscript{40} provided data suggesting that perception of personal vulnerability to cancer and concern with its severity distinguished participants from nonparticipants in a breast cancer screening program. Suchman\textsuperscript{100,102} reports that the "motivation to change one's health practices depends, to a large extent, upon the individual's feelings of personal vulnerability and the seriousness with which he views the health hazard."

Ogionwo\textsuperscript{89} attempted to influence response to a cholera immunization and education program in Nigeria, and showed health concern (motivation), perceived vulnerability to cholera, and knowledge of preventive measures to be highly associated with response (as were several attitudes towards prevention, and correct knowledge of cholera).

In an experimental attempt to change beliefs and behavior of women in an urban ghetto concerning screening for cervical cancer, Kegeles\textsuperscript{65} found that women with relatively high beliefs in personal vulnerability, and in the effectiveness of cytology were more likely to obtain tests.

Tash et al.\textsuperscript{103} reported results from a secondary analysis of interviews of 1,862 persons, which dealt with various aspects of dental health attitudes and behavior. Although the questions asked were not deliberately designed to test the HBM, they can be examined in this light. Surprisingly, individuals with low susceptibility were more likely to use the dentist preventively; this was interpreted by the investigators as demonstrating that persons that go regularly to the dentist feel that such care will maintain their oral health — thus, they will feel relatively less vulnerable to dental problems than will those who do not take preventive dental action. They also found that individuals who believed in the seriousness of dental disease consequences, but who did not perceive dental care as very costly or painful, were more likely to make preventive visits.

Table 2 summarizes the research reviewed in the area of preventive health behavior.

**Sick-Role Behavior**

Several research projects have extended the model to the explanation and prediction of such sick role behavior as patient compliance with prescribed medical regimens. In these studies, where a professional diagnosis of illness has already been made, the concept of vulnerability has been changed to mean perceived resusceptibility to the index disease.

Of the four available reports of research examining the relationship between subjective vulnerability and taking medication, three have concentrated on rheumatic fever as the disease model. Heinzelmann\textsuperscript{53} dem-
## Table 2. Summary of Studies Using One or More Health Belief Model Variables to Predict Preventive Health Behavior

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Study Design*</th>
<th>Recommended Health Behaviors</th>
<th>Susceptibility</th>
<th>Severity</th>
<th>Benefits</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hochbaum</td>
<td>Survey/R</td>
<td>X-ray screening for TB</td>
<td>+</td>
<td>?</td>
<td>+</td>
<td>not measured</td>
</tr>
<tr>
<td>Rosenstock, et al.</td>
<td>Review of surveys/R</td>
<td>Polio vaccination</td>
<td>+</td>
<td>?</td>
<td>+</td>
<td>?</td>
</tr>
<tr>
<td>Flach</td>
<td>Survey/R</td>
<td>Pap test</td>
<td>+</td>
<td>yes</td>
<td>not measured</td>
<td>+</td>
</tr>
<tr>
<td>Leventhal, et al.</td>
<td>Survey/P</td>
<td>Influenza vaccination</td>
<td>+</td>
<td>yes</td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Kegeles</td>
<td>Survey/R</td>
<td>Preventive dental visit</td>
<td>+</td>
<td>yes</td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Kegeles</td>
<td>Survey/P (follow-up)</td>
<td>Preventive dental visit</td>
<td>+</td>
<td>yes</td>
<td>0</td>
<td>no</td>
</tr>
<tr>
<td>Kirscht, et al.</td>
<td>Survey/P</td>
<td>Dental, TB x-ray, cancer</td>
<td>0</td>
<td>no</td>
<td>0</td>
<td>no</td>
</tr>
<tr>
<td>Suchman</td>
<td>Survey/R</td>
<td>Accident prevention measure (safety glove)</td>
<td>+</td>
<td>yes</td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Kegeles</td>
<td>Exper./P</td>
<td>Pap test</td>
<td>+</td>
<td>yes</td>
<td>not measured</td>
<td>+</td>
</tr>
<tr>
<td>Tash, et al.</td>
<td>Survey/R</td>
<td>Preventive dental visit</td>
<td>–/+</td>
<td>yes</td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Haefner and Kirscht</td>
<td>Exper./P</td>
<td>Preventive exams: TB, cancer, heart disease</td>
<td>+</td>
<td>yes</td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Becker, et al.</td>
<td>Survey/R</td>
<td>Screening for Tay-Sachs</td>
<td>+</td>
<td>yes</td>
<td>–</td>
<td>yes</td>
</tr>
</tbody>
</table>

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* R = retrospective; P = prospective.
† Statistically significant at the p ≤ 0.05 level; ? = not reported.
onstrated continued penicillin prophylaxis behavior of college students with a history of rheumatic fever to be related to subjective estimates of the likelihood of having another attack. Similarly, Elling and associates\(^37\) found significant positive associations between a mother’s belief in the possibility of her child getting rheumatic fever again and compliance in both administering the penicillin and in clinic attendance.

The only negative finding is reported by Gordis and others,\(^47\) where only 58 per cent of the compliers, as opposed to 73 per cent of the noncompliers, believed it possible that their child could get another attack of rheumatic fever. However, the authors speculate that these results “... reflect an awareness on the part of the respondents that since their children were poor compliers they were more susceptible and may not necessarily bear on the influence of perception of susceptibility on compliance status.”

Finally, Becker and others\(^12\) observed that mothers who felt the child was susceptible to the present acute illness (otitis media) would more often give the medication properly, and more often keep follow-up appointments at the clinic.

Medicare Care

Although Gordis\(^17\) could show no connection between the mother’s “degree of worry about the child’s health” and compliance, Becker\(^12\) found higher rates of compliance for mothers who felt their child was “easily susceptible to disease” and “often ill,” and who thought that “illness was a substantial threat to children in general.” Only one study\(^14\) has looked at belief in the diagnosis; here, a score was constructed combining the mother’s extent of agreement with the physician’s decision and her opinion of how sure the doctor was that the child had an ear infection. This “degree of certainty” score successfully predicted compliance with the penicillin therapy.

The role played by perceived severity in patient compliance with prescribed therapies is quite similar to that demonstrated for perceived vulnerability. Heinzelmann\(^53\) found the patient’s view of rheumatic fever’s seriousness, both in an absolute sense and when compared with other diseases, to be predictive of compliance with penicillin prophylaxis. When Gordis and associates\(^47\) questioned mothers concerning their estimates of the severity of another attack of rheumatic fever, more compliers (44 per cent) than noncompliers (25 per cent) thought the impact on their children would be serious. In research conducted in several private pediatric practices, Charney and others\(^24\) concluded that a mother’s perception of severity of the disease at onset (both streptococcal pharyngitis and otitis media) was significantly related to likelihood of giving the medication, and Becker and associates\(^12\) and Francis and others\(^43\) report similar associations for perceived seriousness (in terms of both organic severity and interference with the mother’s activities) and compliance with both medication therapy and appointment-keeping.

Two additional studies\(^23\),\(^44\) also report that parents’ estimates of severity of the child’s condition is positively related to parental compliance with respect to obtaining follow-up care in a wide range of school-discovered illnesses and health defects.

Perception of benefits has also been shown to be related to patient compliance with therapy. Both Elling\(^37\) and Heinzelmann\(^53\) report positive associations between belief in the ability of penicillin to prevent recurrence of rheumatic fever and adherence to the regimen. Becker\(^12\) found that “belief in efficacy of clinic medications” predicted regular administration of the penicillin, and that “belief in doctors’ ability to cure illnesses” was related to keeping clinic appointments. Only Gordis\(^17\) found no association between belief in the power of the drug to prevent another attack and compliance.

In studies of related sick role behaviors,
Donabedian identifies “doubt about the recommended procedure” as a reason for elderly patients not following the physicians’ instructions relevant to their chronic illnesses, and Gabrielson showed that faith in the effectiveness of professional care correlated with parents’ compliance with obtaining follow-up care for their school-age children.

While perceived “costs” or barriers have been measured in a multiplicity of ways, several variables have been dependable predictors of noncompliance. Fear of the pain or discomfort, and of the monetary expense associated with obtaining dental care is inversely associated with compliance, as are such “negative” aspects of prescribed therapeutic regimens as: cost, extent to which new patterns of behavior must be adopted (especially if the patient is experiencing work, family, or other social problems), complexity, duration, and side effects. Accessibility was predictive for follow-up of school referrals.

A summary of sick-role behavior studies most relevant to the model appears in Table 3. Reviews of model-related research in the areas of preventive dental behavior and behavior related to chronic illness have also been conducted by members of the Subcommittee.

Additional Variables

In its review, the subcommittee also assessed a variety of other psychosocial dimensions for possible inclusion in a summary framework.

In terms of motivation, several studies have examined desire (or intention) to comply. The belief that “people should do what the doctor tells them” has been shown to be associated with administering penicillin. Davis found that 40 per cent of the clinic outpatients studied admitted that they had never intended to comply, and Alpert (in research on broken appointments in an outpatient department) found patients who admitted that they had never intended to keep their return clinic appointments. Suchman and Becker, looking at preventive and sick-role behaviors (respectively), reported that compliers were more likely to seek medical care (as opposed to self-treatment) in the presence of symptoms, and worry about health in general was positively correlated with action in two studies (but not in a third). Also, the original HBM dealt only with negative aspects of health (i.e., an individual’s behavior when threatened by a disease or condition). However, it is likely that positive health motivations exist and account for some portion of sick role behavior. For example, Becker found that mothers who complied with the regimen prescribed and with the follow-up appointments made for the child were more likely than noncompliers to own a fever thermometer, to give the child special foods and vitamins, to have high social mobility desires for the child, and to worry about being a “good” mother. Family-level influences have also been reviewed.

Davis found that “patterns of communication which deviate from the normative doctor-patient relationship will be associated with patients’ failure to comply with doctors’ advice,” and Francis and others reported that a mother’s compliance with a regimen prescribed for her child is better when she is satisfied with the initial contact, perceives the physician as friendly, and feels that the doctor understood the complaint; further, they found that “the extent to which patients’ expectations from the medical visit were left unmet, lack of warmth in the doctor-patient relation, and failure to receive an explanation of diagnosis and cause of the child’s illness were key factors in noncompliance.” Various other investigations have also linked different aspects of the patient-
<table>
<thead>
<tr>
<th>Investigators</th>
<th>Study Design</th>
<th>Recommended Compliance Behaviors</th>
<th>Susceptibility</th>
<th>Severity</th>
<th>Benefits</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elling, et al.³⁷</td>
<td>Survey/R</td>
<td>Penicillin prophylaxis</td>
<td>+</td>
<td>yes</td>
<td>not measured</td>
<td>+</td>
</tr>
<tr>
<td>Heinzelmann³³</td>
<td>Survey/R</td>
<td>Penicillin prophylaxis</td>
<td>+</td>
<td>yes</td>
<td>+</td>
<td>yes</td>
</tr>
<tr>
<td>Bergman and Werner¹⁸</td>
<td>Survey/R</td>
<td>Penicillin regimen</td>
<td>not measured</td>
<td>not measured</td>
<td>not measured</td>
<td>0</td>
</tr>
<tr>
<td>Charney, et al.²⁴</td>
<td>Survey/P</td>
<td>Penicillin regimen</td>
<td>not measured</td>
<td>+</td>
<td>yes</td>
<td>not measured</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gabrielson, et al.⁴⁴</td>
<td>Survey/R</td>
<td>Follow-up care for school discovered health defects</td>
<td>not measured</td>
<td>+</td>
<td>yes</td>
<td>+</td>
</tr>
<tr>
<td>Becker, et al.¹⁴</td>
<td>Survey/P</td>
<td>Penicillin regimen</td>
<td>+</td>
<td>yes</td>
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* R = retrospective; P = prospective.
† Statistically significant at the p ≤ 0.05 level; ? = not reported.
**Motivations**
- Concern about (salience of) health matters in general
- Willingness to seek and accept medical direction
- Intention to comply
- Positive health activities

**Value of Illness Threat Reduction**
- Subjective estimates of:
  - Susceptibility or reusceptibility (incl. belief in diagnosis)
  - Extent of possible bodily harm
  - Extent of possible interference with social roles
  - Presence of (or past experience with) symptoms

**Probability That Compliant Behavior Will Reduce the Threat**
- Subjective estimates of:
  - The proposed regimen’s safety
  - The proposed regimen’s efficacy to prevent, delay, or cure (incl. “faith in doctors and medical care” and “chance of recovery”)

**Demographic** (very young or old)
- Structural (cost, duration, complexity, side effects, accessibility of regimen; need for new patterns of behavior)

**Likelihood of**
- Compliance with preventive health recommendations and prescribed regimens; e.g., screening, immunizations, prophylactic exams, drugs, diet, exercise, personal and work habits, follow-up tests, referrals and follow-up appointments, entering or continuing a treatment program.

*At motivating, but not inhibiting, levels.

**FIG. 2.** Summary hypothesized model for explaining and predicting individual health-related behaviors (after Becker and Maiman)."
technologies, to mass communication appeals, to behavior modification and to "social engineering" interventions.

Other pressing research needs include increased standardization of data-gathering and analysis techniques, examination of the stability of the model's major variables over time, and studies directed at determining both the origins of these beliefs and the conditions under which they are acquired.

**Practice Implications**

Most health programs involve obtaining the cooperation of some clientele (whether they be asymptomatic, experiencing symptoms, or actually sick); in doing so, each program makes assumptions (explicitly or implicitly) about how and why people behave as they do, and about how that behavior might be modified. Unfortunately, in its review of hundreds of references, the Subcommittee did not find a clear-cut conceptual model guiding educational practice in health programs, but rather, a multiplicity of uncoordinated bits of theoretical stances and isolated research findings. Similarly, although a variety of mechanisms (e.g., mass media campaigns, group dynamics, behavior modification, patient-provider contracts, social support systems, and the possibilities of social engineering) are available which are potentially capable of altering attitudes and actions, these approaches (and related techniques) exist without reference to the nature of the beliefs or behaviors that are to be modified. Such specification can only develop from a conceptual or content knowledge of the field. While no one would claim that the Health Belief Model is complete in accounting for all variations in how people behave with respect to their health, sufficient evidence has now been amassed to conclude that the model provides a workable theoretical and practical foundation. The Subcommittee therefore suggests that, because the model (as elaborated in Figure 2) is an at-least partially developed, evolving theory, many of whose hypotheses have been found useful, the model be employed as an underpinning for much of our educational efforts directed at the public, and at health professionals (including health educators themselves).

**Dimensions for Intervention**

To summarize, research findings reviewed in this paper suggest that a decision to take health action is influenced by the individual's: 1) "health motivation," or readiness to be concerned about health matters; 2) perceptions of relative vulnerability to illness; 3) perceptions of the potential severity of illnesses or their sequelae; 4) beliefs about the relative efficacies of alternative actions; 5) beliefs about potential physical, economic, and psychological costs associated with these actions; and 6) reactions to various cues or critical incidents which might serve to trigger a response. In addition, it has been observed that certain personal characteristics (e.g., age, sex, socioeconomic status, knowledge, general coping ability) may themselves influence health motivations, threats, and perceptions of the benefits of action. The theory holds that persons who exhibit the appropriate combination of motives and beliefs will accept and undertake recommended behaviors designed to prevent illness in the absence of symptoms, to define the state of their health in the presence of symptoms, or to restore good health after diagnosis of actual illness.

**Educational Diagnosis and Strategies**

While these perceptions have been demonstrated to be modifiable, there is no a priori reason that indicates that interventions directed at any one dimension will, in the long run, prove more effective than attempts to alter the others. Health education programs might therefore legiti-
mately focus on any one or combination of health-behavior determinants. However, clues to the selection of appropriate health education strategies can be derived from examination of perceptions about particular health conditions, and from surveys of health beliefs held by various at-risk populations.

For example, studies have shown that most persons regard cancer as extremely serious and without much possibility of beneficial intervention, while other conditions, such as dental decay, seem to be perceived as highly prevalent, frequently very expensive to prevent or control, but not very serious. It would seem, therefore, that an educational program in the area of cancer should, on the average, attempt to reduce fear and to persuade people (where it may legitimately be done) that effective methods of prevention or control are feasible. On the other hand, a program whose objective is caries prevention might better be directed toward increasing fear or concern, and toward suggesting relatively inexpensive methods for reduction of caries. Similarly, in connection with certain health problems of emerging importance, such as genetic disease, the public's knowledge and beliefs seem to be so inadequate that educational activities designed to engage every component of the model appear to be required. Even after genetic counseling, many patients are quite confused or incorrect in their opinions about risks of transmitting disease, about the burden or severity of the disease should it occur, and about techniques available to prevent it.

Health educators should also take into account the different belief levels toward a given condition which exist in different population subgroups. For example, has shown that Health Belief Model perceptions relative to tuberculosis vary significantly with educational level, social class, and ethnic-group membership. One may therefore need to increase perceived susceptibility in one group, perceived severity in another, and belief in benefits in a third. These findings suggest, in turn, the value of obtaining information about a particular population’s health beliefs and motives in advance of some mass media or other health education effort.

Intervention strategies based upon model dimensions may also be planned at small group and one-to-one levels. It is now evident that, to obtain better patient compliance, it is necessary for the physician to impart to most patients something more than basic information concerning the prescribed therapy. The literature abounds in cases of patients who are highly knowledgeable about the illness and the medication, but who nonetheless do not carry out the regimen. However, the various studies of health beliefs show that, of the people who do not follow a health recommendation, some are unmotivated, some lack beliefs in their vulnerability to, or in the seriousness of, the condition, while still others fail to see benefits in proposed actions or ways of overcoming barriers to carrying them out.

These individual differences suggest that no one educational prescription will be suitable for all. But, to devise a unique educational strategy for different individuals or groups requires knowing what health belief components they lack. On the basis of the subcommittee's findings, it is suggested that, for purposes of educational diagnosis, a brief, standardized index of questions employing model variables be administered to each patient (perhaps as a regular part of the history-taking process). Answers to these questions should aid the physician (or other health workers) in estimating the likelihood of each patient's complying with the prescribed regimen, and in identifying the problem dimension or dimensions in each case. Thus, by knowing which model components are below a level presumed necessary for compliance,
the health worker might tailor interventions to suit the particular needs of each individual. A parallel approach can be undertaken with small groups formed to deal with particular health concerns (e.g., weight control and smoking clinics).

**Education of Health Care Providers**

These suggestions imply the need to modify formal medical, public health, and allied health care curricula in order to produce health care practitioners oriented toward prevention as well as treatment, and toward the “whole person,” his psychology, and the importance of preparing him for personal responsibility in health maintenance and disease control. Current medical education places little emphasis on the necessity for adequate patient education, and few schools provide any exposure to information on the conditions under which patients will follow advice, on methods for communicating with clients, or even on interview skills for finding out what the patient knows, believes, or is concerned about. Thus, an important role which behavioral scientists and health educators may share is that of bringing into the education of health workers a greater emphasis on the psychosocial factors that influence health behavior.

Providers of health care need to learn that: 1) behavior is motivated; 2) certain beliefs seem central to a client’s decision to act; 3) not all persons possess these beliefs and motives to equal degrees; and 4) intellectual information, while necessary, is often not sufficient to stimulate needed beliefs. In addition, they should be encouraged to accept substantial responsibility for patient or client education, and to view such activity as important. It is therefore recommended that information concerning the model dimensions and their modification, as part of a program covering a variety of relevant behavioral science perspectives, be made a regular part of the curricula of health care training programs.

**Children’s Health Beliefs**

While in the short run, programs requiring voluntary participation must be attacked on a disease by disease basis with special campaigns devoted to each, in the long run this would appear to be a rather inefficient (and possibly ineffective) method. It is inefficient because it requires the target audience to acquire a unique set of facts and beliefs concerning each condition. It may be ineffective because it may involve attempts to transmit knowledge and motivation that cannot be adequately communicated in a brief pamphlet or through a series of short television, radio, or telephone announcements. Moreover, it is apparent that changing life style patterns is much more difficult than inducing people to undertake and maintain appropriate health behaviors in the first place.

It therefore seems essential to begin a multi-generational effort to introduce relevant health-related curricula into the education system in order to enhance subsequent likelihood of the consumer’s learning the potential benefits of voluntary health action. Few systematic efforts have been made to develop curricula specifically designed to stimulate the acquisition of desired health beliefs. Yet, it is interesting to note that several successful efforts to modify health behavior through the use of emotional appeals have been performed on children. Many opportunities exist for the health educator in preschool, primary, and secondary education to influence children both to develop desirable health habits and to acquire desired health beliefs. Rosenstock notes that such curricula could “build on theories of the natural causation of disease and germ theory,” and could “deal with the topics of susceptibility to various diseases, with the personal and social consequences of unchecked disease and with approaches to the prevention, early detection and control of disease.” Thus, much can be done by health educators to lay the foundations.
for later minimizing in the adult the psychological barriers to accepting recommended, beneficial health services.

**Emphasis on Beliefs**

Finally, while the model stresses belief dimensions, it should be noted that the model does not presuppose or imply a particular strategy for change. While attempts at direct persuasion are an obvious tactic, it has been shown that modification of the structure of the medical care system (e.g., providing physician continuity in outpatient clinics\(^1\)) is an effective method for changing beliefs as well; and environmental and structural changes may also have long-term effects on health beliefs (clearly, they affect behavior in part through the mediation of beliefs). Even the "social engineering" approach to behavior must consider the belief consequences of change strategies, as well as the beliefs of the policy makers and change agents. It is therefore the hope of the Subcommittee that this focus on individual beliefs and perceptions will continue to advance our understanding of, and ability to modify, the important dimensions of patient behavior.

**References**


60. Jenkins, C. D.: Group differences in percep-
# INDIVIDUAL HEALTH-RELATED BEHAVIORS

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