

Motivations as Predictors of Health Behavior

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IN a chapter entitled, "Motivation Research: An Elusive Challenge," Knutson (1) observes:

Health behavior seems so inseparably linked to motivation that logic impels one to orient any discussion of health practices to human needs and human motives. . . . Unfortunately, an enormous gap exists between knowing that health behavior is motivated and identifying the specific motivational components of any particular act.

Adherence to medical instructions is usually essential to successful treatment. Rates of compliance, however, are often disturbingly inadequate (2-4), and little is known about factors which may motivate compliance. In this study we examine the explanatory value of employing the health motivations and perceptions of mothers as predic-

tors of their compliance with regimens prescribed for their children.

Instances of poor compliance among low income pediatric clinic populations are especially dramatic and well documented. For example, Elling and co-workers (5) discovered that 45 percent of the children they studied were given less than half the penicillin prescribed. Similarly, Feinstein and associates (6) estimated compliance at 50 percent; Gordis and co-authors (7) at 38 percent; and Bergman and Werner (8) found that, by the ninth day of a 10-day regimen, only 18 percent of pediatric patients at the clinic studied were still receiving penicillin.

Unfortunately, research directed at understanding compliance behavior has yielded an unsystematic multiplicity of variables which are frequently either not predictive of compliance (9, 10) or are mutually contradictory (11). The incongruities appear to be rooted in past reliance on demographic, physiological, and environmental variables which are not necessarily related to motivations. Kasl and Cobb (12) noted that studies of reactions to illness have dealt mostly with "superficial demographic and background variables rather than with fundamental, theoretically derived attitudes and subjective perceptions."

The purposes of our research were therefore to (a) hypothesize the dimensions of motivations likely to affect adherence to medical regimens,

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(b) develop and test measures of those dimensions, using variables that are potentially modifiable, and (c) evaluate those variables as valid predictors of compliance.

Dimensions of Motivation

The aspect of social psychological research we selected as a likely source of the most relevant explanations of incentives for compliance is "value-expectancy theory," which attempts to describe behavior or decision making under uncertainty (13-15).

Briefly, behavior is predicted from the value of an outcome and the expectancy that a given action will result in that outcome. Atkinson's (16, 17) application of this theory to the area of achievement specifies (a) the motivation needed to achieve success or to avoid failure (for example, to avoid illness or to get well), (b) the incentive value of a particular goal (for example, how much one desires success or the avoidance of failure), and (c) the expectation of a successful outcome (for example, belief that a particular action will produce the desired results).

This theory of motivation underlies an approach drawn mainly from Lewin (18), which has been used successfully to predict such preventive health behavior as obtaining annual checkups, tuberculosis and Papanicolaou screening tests, and prophylactic dental visits (19-23). Formulated by Rosenstock (24), as well as by those he cites, the Health Belief Model attempts to explain preventive health behavior on the basis of a person's perceptions of susceptibility to a disease, the severity of the disease, and the benefits and costs associated with actions to prevent it. A cue or triggering mechanism is also believed necessary to prompt appropriate action. There appears to be no inherent reason why the same motivational formulation could not be applied to the actions taken by persons to become well when they know they are ill, especially if the concept of susceptibility is extended to mean the probability of progressive effects or of recurrence.

Measures of Motivation

The chart shows our modification and extension of the Health Belief Model along with the specific variables we used to measure each dimension of motivation. The term "mother's motivations" in the chart refers to the different emotional responses induced by a given class of stimuli—health matters. The perceptions of mothers were exam-

ined because (a) it is usually the mother—particularly in a low income clinic population—who decides whether a child is ill, whether the child is brought to care, and whether a regimen is followed and (b) because studies (25) suggest that many of the health-related attitudes and behavioral patterns that the child will manifest as an adult are acquired from the persons responsible for the first definitions of the child's illnesses, persons from whom the child learns which symptoms are important as well as how and where to seek help.

Our first modification of the Health Belief Model was the explicit introduction of the concept of general health motivation—different degrees of readiness to undertake a health action are aroused by health cues. Some dimensions of the health motivations of mothers are (a) physical threat to the child (evoked by thoughts of the child's having different illnesses and by the mother's perception of the child's state of health), (b) feelings of ability to control health matters, (c) willingness to be directed by medical personnel, and (d) concern with, and probable action to maintain, the overall good health of the child.

Little is known about the nature and distribution of these dimensions. Dimensions (a)—physical threat—and (d)—concern about overall good health—imply that frank motives toward good health exist; avoidance of disease and attainment of positive physical states would themselves be motivating. The original Health Belief Model dealt only with the negative aspect of health, namely, the threat of a disease or pathological condition. While it can be argued that any health action implies the perception of a threat, it is possible that positive health motivations exist and account for some portion of health-related behavior.

The second modification related to the incentive value of compliance. The magnitude of the threat posed by the child's current illness was an incentive for the mother to act to reduce that threat. These measures of threat include the mother's perceptions of the following:

1. The child's vulnerability. Since the child was ill, the concepts of potential resusceptibility to the present illness and of the probability of complete recovery were used.

2. The degree of bodily harm that the illness may have caused.

3. The problems that the illness may have created for the child (for example, staying in bed or

fretfulness) and for the mother (for example, interruption of parental, occupational, or social roles).

This "interference" dimension implies that health and disease may become motivating through conditioning to more primary drives. In this interpretation, disease threats are responded to only insofar as they are seen as interfering with the attainment of important goals.

The third modification was the mother's perception of the likelihood that compliance with the physician's instructions would reduce the threat. This subjective probability was evaluated by the following measures:

1. Perceived accuracy of the diagnosis. Credibility is often impaired when an illness is frightening, if the mother has an erroneous opinion about health ("He's had it before, and I know you can't get that twice."), when she lacks confidence in a particular diagnostic test, and in similar situations.

2. Perceived usefulness of medications previously obtained from the clinic.

3. Amount of general confidence in the usefulness of modern medical practices.

Finally, the motivational components of the model were combined to explain and predict the probable degree to which the mother would comply with each aspect of the medical regimen. If the variables in the model are useful predictors of behavior, then persons and groups may be characterized as being motivated primarily by different combinations of these variables. We hope the clues that became evident in our results will indicate components of motivation that health professionals can use in obtaining patients' compliance with instructions.

Methods

During early 1971, we interviewed a random sample of 125 female adults who were accompanying children being treated for otitis media in the comprehensive child care clinic at a large teaching hospital. The nature of the study was not disclosed either to the clinic staff or to the patients' mothers.

The children's ages ranged from 6 weeks to 10 years. A 10-day regimen of orally administered liquid antibiotic was prescribed for all of these patients, and each was given an appointment for a followup visit. The medication was provided free of charge. The woman who brought the child to the clinic was interviewed at the clinic for an hour immediately after the child was examined and

treated by a physician. The respondents were from 14 to 70 years old, and all but three were black. Prior screening at intake assured that only mothers or grandmothers claiming to be responsible for the children's daily care and for bringing them to the clinic when necessary were included in the sample.

Three interviews were not included in the study because they were incomplete, and six interviews were omitted when we learned that the physician had given the six children an injection of a long-acting antibiotic. Consequently, 116 interviews were analyzed.

Dependent variables. Compliance was defined as administering the prescribed medication and keeping the followup appointment. Data from the patients' charts indicated that only 40.7 percent of the followup appointments were kept.

The difficulty in obtaining specimens of urine for antibiotic assay hampered us in measuring compliance. The design of the study required that community health visitors from the clinic make unannounced visits to the patients' homes 5 days after the regimen was to have begun. Incorrect addresses, families or children not at home, difficulty in obtaining urine samples from infants, inclement weather, and samples not returned or collected more than 24 hours late were some of the obstacles resulting in the collection and testing of only 59 usable samples. It did not seem likely, however, that any of these hindrances to collection would be related to the study variables. Thirty samples were negative for the antibiotic, indicating a noncompliance rate of 50.19 percent on the fifth day.

Finally, a measure of long-run dependability in keeping appointments was calculated for each respondent. The number of appointments kept was divided by the number of appointments made during a 12-month period. Only parents whose children were given appointments for one or more followup visits for treatment of acute illnesses were counted when calculating this ratio. As no method of differential weighting was used, this procedure assigns the same score to a mother who keeps four of eight appointments as to one who keeps one of two. Thus, some information is lost to further analysis.

Results

The relationships between broad health motivations and the three measures of compliance are shown in table 1. These relationships include the

Health Belief Model reformulated to predict compliance of mothers of pediatric patients

MOTHER'S MOTIVATIONS

General health motivations:

Physical threat
Control over health matters
Medical motivation
Concern about general health

Value of reducing threat:

Child's vulnerability
Degree of bodily harm to child
Interference with social roles

Probability of taking action to reduce threat:

Belief in diagnosis
Perceived efficacy of the prescribed medicine
Belief in modern medicine

MOTHER'S COMPLIANCE

Likelihood of:

Giving prescribed medicine
Keeping followup appointment
Keeping appointments over time

measures of physical threat, control over health matters, medical motivation, and general concern about the child's health.

Physical threat. Respondents were read a list of 11 illnesses—bad cold, mumps, poliomyelitis, asthma, pneumonia, bad cut on arm, rheumatic fever, measles, anemia, streptococcal infection of the throat, and accidentally drinking poison. For each illness, the mother was asked the following questions.

1. Of those the child has had, which ones would he ever get again?
2. Of those the child has not had, which ones would he ever get?

The ratio of past illnesses to those which could recur was the resusceptibility score, and the ill-

nesses not experienced in relation to those which could occur was the potential susceptibility score. Both scores were significantly related only to the ratio of appointments kept. Nevertheless, mothers who felt that their children became ill easily and often, and who also perceived illness as an important threat to all children, usually were more likely to keep appointments and to be giving the medication on the fifth day of the prescribed regimen.

Control. Control over health matters was approached on a general level (sample question: "Do you feel that most children's illnesses can be prevented?") and on a specific level (sample agree-disagree question: "In an environment such as the one in which I live, you just can't do much to keep a child healthy/from having accidents").

The results indicate that feelings of control, at least as we measured them, are not related to compliance.

Medical motivation. A scale of compliance was constructed by using a series of statements with which the respondent could agree or disagree. One such statement was: "Old-fashioned remedies are still better than the things the doctors prescribe." Although this scale of compliance predicted the giving of the medicine and the keeping of the specific followup appointment, a single question used in compiling the scale was more productive than the entire series. Mothers who agreed with the statement, "I try to do exactly what the doctor tells me to do, without question," were—when compared with the other respondents—significantly more likely to give the medication, make the followup visit, and keep appointments.

General health concern. As the fourth section of table 1 indicates, our measure of positive concern with health matters was a consistently accurate predictor of the ratios for giving medication and keeping appointments. Agreement with the statement, "I worry a lot about my child's health," was significantly correlated with all the dependent variables.

A less direct approach to concern with health was a score based on the following list of 10 symptoms:

1. Fever
2. Eating less than usual
3. Pain in the right side of abdomen
4. Nightmares
5. Vomiting more than once during the day
6. Doing poorly in school
7. Diarrhea
8. Cough for 2 or more days
9. Urine different from usual
10. Sore throat and runny nose.

The mother was asked whether, if each symptom appeared, she would take her child to a physician immediately or wait a day or two to see what developed. A similar question was asked concerning the mother's usual behavior when her child seemed slightly ill. Mothers who reported that they usually took the child to the physician without delay were also more likely to give the child his medicine and to keep appointments.

A concern for maintaining good health was evidenced by mothers who said their children were given vitamins or special foods, or both, to keep them well. This concern was substantially associated with all the elements of compliance. Ownership of a fever thermometer, an indicator of medical concern, was positively related to the ratio of appointments kept.

Overall, these variables dealing with general concern about the child's health predicted the par-

Table 1. Correlations between variables in health motivation and 3 measures of compliance with medical instructions

Variables in health motivation	Measures of compliance					
	Administered medication		Kept followup appointment		Ratio of appointments kept	
	Gamma	Number	Gamma	Number	Gamma	Number
Perception of physical threat:						
Resusceptibility to past illness	0.264	56	0.222	90	¹ 0.347	71
Potential susceptibility to other illnesses . . . . .	.300	58	.276	94	¹ .375	73
Easily susceptible and often ill	¹ .340	59	.199	97	¹ .314	76
Illness as a threat to children in general	¹ .328	59	.172	96	¹ .303	74
Control over health matters:						
Can prevent most illness . . . . .	.287	59	.211	93	.015	72
Can avoid illness or accidents . . . . .	.021	59	.282	96	.288	74
Medical motivation:						
Scale of compliance	¹ .401	59	¹ .298	96	.190	74
"Do what doctor tells me"	¹ .449	59	¹ .367	96	¹ .315	74
General concern about health:						
Worry about health	¹ .351	59	¹ .430	96	¹ .424	74
Worry about specific potential illnesses . . . . .	.292	59	.169	100	¹ .342	77
"Take or wait" score from symptoms list	¹ .377	59	.275	101	¹ .385	78
General delay	¹ .373	58	¹ .339	98	.217	77
Gives special foods	¹ .362	59	¹ .400	96	¹ .317	74
Gives vitamins regularly	¹ .315	59	.242	95	¹ .369	73
Owns fever thermometer . . . . .	.211	57	.146	98	¹ .313	78

¹ Denotes correlations statistically significant at $P \leq 0.05$.

Table 2. Correlations between 3 measures of compliance and the perceived levels of threat from the current illness

Threat level variables	Measures of compliance					
	Administered medication		Kept followup appointment		Ratio of appointments kept	
	Gamma	Number	Gamma	Number	Gamma	Number
Child's vulnerability—potential resusceptibility to present illness.....	¹ 0.367	59	¹ 0.339	102	0.122	80
Degree of bodily harm to child—severity of present illness (score).....	¹ .416	59	¹ .340	103	.288	80
Interference with social roles:						
Of child.....	.225	58	.012	97	.275	75
Of mother.....	¹ .307	59	.176	98	¹ .325	76

¹ Denotes correlations statistically significant at $P \leq 0.05$.

ent's dependability in keeping several appointments over a period better than other aspects of compliance (including keeping the specific followup appointment). Since these measures of motivation did not relate to questions about the child's current illness, it seemed reasonable to assume that they related more directly to a pattern of health behavior over a prolonged period. None of the 15 motivational variables, however, predicted compliance with the giving of the medication. Combined, these variables depict the compliant mother as one who (a) worries about her child's health, (b) perceives him as being susceptible to illness and often ill, (c) brings him to the physician at the first sign of illness, and (d) acts to maintain the good health of the child. This type of mother is also more likely to keep the specific followup appointment and, especially, to keep appointments over time.

Perceived levels of threat. Table 2 shows the correlations between the measures of compliance and the estimated levels of threat induced by the current illness. Mothers who believed that their child would probably have an ear infection recur were more likely to comply. To measure the mother's perception of the harmfulness of the current illness, questions were constructed to elicit her estimates of its seriousness. The perceived intensity of the child's illness and the probable duration, sequelae, and seriousness of the infection were compared with those for his previous illnesses. This score of severity was an accurate indicator of compliance as related to the current illness. Mothers also revealed the extent to which the current illness would interfere both with the child's and their own activities. Correlations show interference with the mother's activities to be the

more useful measure because it accurately predicted the giving of the medicine and the ratio of appointments kept.

Thus, only one perceived threat variable was significantly associated with appointments kept over a 12-month period, while almost all of the previously discussed measures of motivation were good indicators. It appears that measures of perception related to a specific illness are probably (and logically) the best bases for predicting behavior relevant to that illness. Conversely, perceptions of health matters at a more abstract level are likely to correlate most consistently with health behavior that is independent of that illness. Therefore, the significant gamma between (a) interference of the child's current illness with the mother's activities and (b) the ratio of kept appointments may mean that we were tapping the broader problem of the mother's difficulties when her child is ill (such as having to wait many hours in a clinic).

Reduction of threat. A person probably will not undertake a recommended health action unless he believes it is at least somewhat effective in preventing or solving a health problem. The respondents were therefore questioned about their faith in the diagnosis, medication, and efficacy of modern medicine. The correlations in table 3 reflect the likelihood of taking action to reduce the threats of the current illness.

The degree of certainty score was based on three views of the current diagnosis: the extent of agreement between the mother and physician concerning the accuracy of the diagnosis, the mother's opinion of how confident the physician felt about his diagnosis, and how sure she felt a physician could be of diagnosing an ear infection by looking

into a child's ear. Mothers with more confidence in the diagnosis were more likely to have given the prescribed medication on the fifth day. The relationship of this score to the ratio of kept appointments suggests, however, that while the questions pertained to a specific episode, the responses reflected a more general faith in physicians and in their ability to diagnose illnesses.

The mother's evaluation of the usefulness of medicines obtained previously from the clinic yielded significant correlations only with the giving of the medicine. It is possible that mothers who perceived the medicines as not very useful were also those who, in the past, had failed to comply properly with the prescribed medication regimen and thus had observed inadequate outcomes.

Lastly, mothers were requested to evaluate the degree to which physicians could alleviate or cure

each illness on the previously described list. This score, unrelated to the current illness, was significantly correlated only with the ratio for keeping appointments. This correlation reinforced the impression of the existence of relationships among general measures of concern about the child's health and long-run health behavior.

Modifying factors. Although a person may be aroused by health matters, may be threatened by a particular illness, and believe that a particular action will reduce that threat, his readiness to take a recommended health action remains subject to modification by several factors.

Table 4 shows that age, marital status, and the mother's level of formal education were factors independent of her compliance. The presence of more persons in the home indicated only that appointments over a long period would be kept. Perhaps the convenience of having an adult al-

Table 3. Correlations between the perceived probability of threat reduction and 3 measures of compliance

Variables affecting threat reduction	Measures of compliance					
	Administered medication		Kept followup appointment		Ratio of appointments kept	
	Gamma	Number	Gamma	Number	Gamma	Number
Belief in diagnosis—degree of certainty score	¹ 0.463	59	0.287	103	¹ 0.345	80
Perceived efficacy of the medicine—belief in efficacy of clinic medicine	¹ .332	57	.081	98	.157	80
Belief in modern medicine—doctors' ability to cure illnesses on list (score) . . . . .	.286	59	.120	100	¹ .382	77

¹ Denotes correlations statistically significant at $P \leq 0.05$.

Table 4. Correlations between the variables modifying readiness to take a recommended action and 3 measures of compliance

Variables modifying readiness	Measures of compliance					
	Administered medication		Kept followup appointment		Ratio of appointments kept	
	Gamma	Number	Gamma	Number	Gamma	Number
Related to mother:						
Age	0.126	59	0.132	96	0.121	74
Marital status . . . . .	.189	58	.156	95	.235	73
Education . . . . .	.235	59	.159	96	.168	74
Health . . . . .	.212	59	.134	96	¹ .360	74
Get through day	¹ .556	59	¹ .319	96	1.418	74
Care for children	¹ .305	59	.274	96	¹ .310	74
Status expectation:						
Desire for child	¹ .500	59	.258	96	1.348	74
Expectancy score . . . . .	.281	55	¹ .358	92	1.341	70
Worry about being a good mother	¹ .364	59	.254	96	.276	74
Number of persons in home . . . . .	.176	59	.230	96	1.317	74
Family problems:						
Illness . . . . .	.058	59	.125	96	.059	74
Domestic discord . . . . .	.224	59	.118	95	.190	73

¹ Denotes correlations statistically significant at $P \leq 0.05$.

ways available to stay with other children enabled the mother to take the child to the clinic. The corresponding relationship between appointments kept over time and the mother's reporting that she was in relatively good health may be similarly interpreted.

The study population was, of course, relatively homogeneous with regard to social class. Some investigators (26, 27), however, have examined the behavior of mothers by studying their desires for their children's future status. In this study, aspiration and expectancy were determined by asking the mother how much formal education she would like her child to obtain and what she expected he would actually achieve. The data in table 4 suggest that those mothers who both hoped for and expected more status for their children were more likely to comply. Also, respondents who worried more about being good mothers were more likely to give the prescribed medication.

Because low income families are frequently categorized as "disrupted" or "disorganized," their problems might be substantial barriers to compliance. Table 4 shows that the estimated frequency of illness and the extent of domestic problems are unrelated to compliance. Nevertheless, mothers who reported that it seemed difficult to get through the day and to care for their children were much less likely to give the medicine or to keep appointments.

Variables pertaining to the clinic are shown in table 5. "Continuity of care" has been a public health and medical care shibboleth for some time, but the putative benefits of such an arrangement for delivering health services have rarely been examined empirically (28-30). The extent to which a mother reported usually seeing the same physician on clinic visits correlated significantly with all

the measures of compliance, suggesting that physician continuity does have an ameliorative effect on compliance behavior.

A scale was created based on the mothers' replies to questions about the clinic. The questions covered convenience of appointment times, length of waiting periods, pleasantness of staff, the registration process, and staff-patient communication and relationships. The gammas in table 5 show that a high level of satisfaction with the clinic increased the probability of the mother's giving the medicine and keeping both immediate and future followup appointments.

Each respondent was also asked whether she agreed or disagreed with the following statements:

1. "Sometimes the doctors here don't tell me exactly what to do."

2. "The doctors here want me to bring my child back for more visits even if it really isn't necessary."

Disagreement with both statements was positively related to giving of the medication. The feeling that physicians scheduled only necessary return visits was also significantly associated with keeping both the followup and routine appointments.

Discussion

Test of the model. The motivations examined appear useful in explaining and predicting compliance. Whether at a broad level or dealing with the specific illness studied, variables in each major model category are related to compliance. Unfortunately, the data require nonparametric models of analysis, and multivariate techniques for simultaneously evaluating the motivations have not yet been worked out.

Although the elements in the model are clearly not independent, neither are they strongly related. We examined the relationships among the inde-

Table 5. Correlations between clinic-related variables and 3 measures of compliance

Clinic-related variables	Measures of compliance					
	Administered medication		Kept followup appointment		Ratio of appointments kept	
	Gamma	Number	Gamma	Number	Gamma	Number
Generally sees same physician at clinic.....	¹ 0.596	55	¹ 0.316	90	¹ 0.376	74
Satisfaction with clinic (score).....	1.302	59	1.348	96	1.471	74
Physicians' instructions.....	1.478	58	.290	94	.252	74
Necessity of followup visits.....	1.377	56	1.364	93	1.317	74

¹ Denotes correlations statistically significant at $P \leq 0.05$.

pendent variables and found that one or two basic factors could not account for the patterns of associations. Furthermore, some simple characteristic, such as the mother's education, clearly does not explain the results. The elements do seem to go together, however, in ways that were expected, lending some "construct" validity to the model.

How might the elements of the model combine with one another? Previous discussion of the Health Belief Model (24) and of value-expectancy theory (16) assumed a multiplicative relationship. This assumption appears appropriate because if health motivation, a health threat, or the probability of successful action is zero, then the tendency to act should also be zero. A threat can be nil if the likelihood of occurrence is considered essentially nonexistent, even though the consequences may be horrendous. Thus, we started by assuming a multiplicative relationship among the elements, although this remains a subject to explore.

Each variable in the following list is shown with an abbreviation for the measure of compliance to which it was significantly related. Abbreviations are (R) for the ratio of appointments kept for 12 months, (M) for administering medication, and (A) for keeping the followup appointment.

MOTIVATION VARIABLES

Perceived physical threat to child

Resusceptibility to previous illness (R)
 Potential susceptibility to other illnesses (R)
 Easily susceptible and often ill (M/R)
 Illness a threat to all children (M/R)

Medical motivation

Scale of compliance (M/A)
 "Do what doctor tells me" (M/A/R)

General concern about health

Worry about health (M/A/R)
 Worry about specific potential illnesses (R)
 "Take-wait" score (M/R)
 General delay (M/A)
 Gives special foods (M/A/R)
 Gives vitamins (M/R)
 Owns clinical thermometer (R)

Threat from current illness

Potential resusceptibility (M/A)
 Severity (M/A)
 Interference with mothers' social roles (M/R)
 Degree of certainty score: belief in—
 Diagnosis (M/R)
 Efficacy of medicine from clinic (M)
 Physicians' ability (R)

Variables modifying readiness

Related to mother:

Health (R)
 Get through day (M/A/R)
 Care for children (M/R)
 Status expectation—
 Desire for child (M/R)
 Expectancy score (A/R)
 Worry about being a good mother (M)
 Number of persons in home (R)

Clinic-related variables

Usually saw same physician (M/A/R)
 Believed physicians and followed instructions (M)
 Satisfied with clinic (M/A/R)
 Believed followup visits necessary (M/A/R)

Profile of the noncompliant mother. A profile emerges of the mother who is unlikely to adhere to the medical regimen. This mother is little aroused by stimuli related to health matters; she sees her child as relatively healthy and likely to remain so. Consequently she does not feel much need to heed medical advice, to take the child to a physician as soon as symptoms of illness appear, or to try to undertake special activities for maintaining her child's health. She is unlikely even to own a thermometer to take her child's temperature. The child's current ear infection was not perceived as much of a threat, either physiologically or socially. The noncompliant mother is probably somewhat skeptical of the particular diagnosis and of the total medical care her child receives.

The noncompliant mother evaluates her own health as poor. It is difficult for her to get through the day or to care for her children, and there are fewer persons to help her living in the home. She is generally dissatisfied with most aspects of the pediatric clinic, where she usually sees a different physician at each visit.

The study results may appear to support the desirability of turning mothers into unquestioning, worrisome, overprotective persons so as to enhance the probability of their compliance with physicians' orders. Such a misinterpretation may occur if the fact that the data are relative is ignored. The results show only that compliers are relatively more concerned about their children's health and have relatively more confidence in physicians and clinic care than do noncompliers. Thus, the data suggest the need to increase the health motivations of mothers when these are found to be inadequate for achieving compliance. The new motivation levels, however, should still permit the mother to be rational in her concern

and reasonably skeptical of the care her child receives.

We hope that the study results will enable health professionals to gain a better understanding of the motivational difficulties that mothers might have in carrying out medical instructions. On the basis of the variables studied, it should be possible to construct a relatively brief index of questions for health workers to ask each mother. The answers would aid in estimating the likelihood of each mother's complying with the prescribed regimen and in delineating the dimensions of the problem in each case.

The perceptions and motivations studied are potentially alterable (22-24); thus, by knowing which components are below a level presumed necessary for compliance, the health professional may be able to tailor intervention to suit the particular needs of each person. Correlational analysis is, of course, insufficient to demonstrate causal links between variables. The results, however, clearly identify specific dimensions along which intervention to heighten compliance is likely to be most productive. The results also suggest the value of modifying certain administrative procedures in the clinic, such as insuring continuity of physician care to increase the users' satisfaction.

REFERENCES

- (1) Knutson, A. L.: *The individual, society, and health behavior*. Russell Sage Foundation, New York, 1965, p. 212.
- (2) Marston, M.: Compliance with medical regimens: A review of the literature. *Nurs Res* 19: 312-323 (1970).
- (3) Donebedian, A., and Rosenfeld, L. S.: Follow-up study of chronically ill patients discharged from hospital. *J Chronic Dis* 17: 847-862 (1964).
- (4) Fox, W.: Self-administration of medications: A review of published work and study of problems. *Bull Int Union Tuberc (Paris)* 32: 307-331 (1962).
- (5) Elling, R., Whittemore, R., and Green, M.: Patient participation in a pediatric program. *J Health Hum Behav* 1: 183-191 (1960).
- (6) Feinstein, A. R., et al.: A controlled study of three methods of prophylaxis against streptococcal infection in a population of rheumatic children. *N Engl J Med* 260: 697-702 (1959).
- (7) Gordis, L., Markowitz, M., and Lilienfeld, A. M.: The inaccuracy in using interviews to estimate patient reliability in taking medications at home. *Med Care* 7: 49-54, January-February 1969.
- (8) Bergman, A. B., and Werner, R. J.: Failure of children to receive penicillin by mouth. *N Engl J Med* 268: 1334-1338 (1963).
- (9) Davis, M. S.: Variations in patients' compliance with doctors' orders: Analysis of congruence between survey responses and results of empirical investigations. *J Med Educ* 41: 1037-1048, November 1966.
- (10) Davis, M. S.: Physiologic, psychological and demographic factors in patient compliance with doctors' orders. *Med Care* 6: 115-122, March-April 1968.
- (11) Mitchell, J. H.: *Compliance with medical regimens: An annotated bibliography*. Department of Medical Care and Hospitals, School of Hygiene and Public Health, Johns Hopkins University, Baltimore, 1970, p. ii. Mimeographed.
- (12) Kasl, S. A., and Cobb, S.: Health behavior, illness behavior, and sick role behavior: I. Health and illness behavior. *Arch Environ Health* 12: 246-266, February 1966.
- (13) Feather, N.: Subjective probability and decisions under uncertainty. *Psychol Rev* 66: 150-164 (1959).
- (14) Becker, G. M., and McClintock, C. G.: Value: Behavioral decision theory. *Ann Rev Psychol* 18: 239-286 (1967).
- (15) Kogan, N., and Wallach, M. A.: *Risk taking: A study in cognition and personality*. Holt, Rhinehart and Winston, Inc., New York, 1964.
- (16) Atkinson, J., and Feather, N., editors: *A theory of achievement motivation*. John Wiley & Sons, Inc., New York, 1966.
- (17) Atkinson, J.: *An introduction to motivation*. D. Van Nostrand Company, Inc., Princeton, N.J., 1964.
- (18) Lewin, K.: *A dynamic theory of personality*. Mc Graw-Hill, Inc., London, 1935.
- (19) Hochbaum, G. M.: *Public participation in medical screening programs: A socio-psychological study*. PHS Publication No. 572. U.S. Government Printing Office, Washington, D.C., 1958.
- (20) Leventhal, H., Rosenstock, I. M., Hockbaum, G. M., and Carriger, B. K.: Ch. 3. Epidemic impact on the general population in two cities. *In The impact of Asian influenza on community life: A study in five cities*. PHS Publication No. 766. U.S. Government Printing Office, Washington, D.C., 1960, pp. 53-77.
- (21) Kegeles, S.: Some motives for seeking preventive dental care. *J Am Dent Assoc* 67: 90-98, July 1963.
- (22) Kegeles, S.: Attitudes and behavior of the public regarding cervical cytology: Current findings and new directions for research. *J Chronic Dis* 20: 911-922 (1967).
- (23) Haefner, D., and Kirscht, J. P.: Motivational and behavioral effects of modifying health beliefs. *Public Health Rep* 85: 478-484 (1970).
- (24) Rosenstock, I. M.: Why people use health services. *Milbank Mem Fund Q* 44: 94-127, July 1966.
- (25) Mechanic, D.: The influence of mothers on their children's health attitudes and behavior. *Pediatrics* 33: 444-453, March 1964.
- (26) Duvall, E.: Conceptions of parenthood. *Am J Sociol* 51: 193-203 (1964).

- (27) Swinehart, J. W.: Socio-economic level, status aspiration, and maternal role. *Am Sociol Rev* 28: 391-399, June 1963.
- (28) Haggerty, R. J.: The university and primary medical care. *N Engl J Med* 281: 416-422, August 1969.
- (29) Sussman, M. B., Caplan, E. K., Haug, M. R., and Stern, M. R.: The walking patient: A study in outpatient care. Western Reserve University Press, Cleveland, Ohio, 1967, pp. 15, 19, 122, 145, and 200.
- (30) Gordis, L., and Markowitz, M.: Evaluation of the effectiveness of comprehensive and continuous pediatric care. *Pediatrics* 48: 766-776 (1971).

BECKER, MARSHALL H. (Johns Hopkins University, Baltimore), DRACHMAN, ROBERT H., and KIRSCHT, JOHN P.: *Motivations as predictors of health behavior. Health Services Reports, Vol. 87, November 1972, pp. 852-862.*

In this study of 119 low income mothers (from a random sample of 125), an assessment was made of their health orientation and motivations as indicators of their probable compliance with three aspects of a health regimen. The first two aspects were giving medication and keeping followup appointments when their children had otitis media. The third aspect was keeping appointments at the

pediatric clinic over a 12-month period.

Mothers who complied with various aspects of the regimen were relatively more interested in their children's general health and were more concerned about the current illness. They perceived illness as a substantial threat to their children, but had confidence in the ability of physicians and medication to reduce it.

These mothers worried about their children's health and tried to prevent illness. They also appeared to have more satisfactory interactions with the clinic and seemed better able to manage their life problems.

The study prompted suggestions relating to both the identification of potentially noncompliant mothers and to types of intervention to increase compliance.