Based on variables that can determine preventive use of dentists, a theory of dental behavior was developed. This theory has implications for dental health education, and they are set forth as propositions capable of being tested in an empirical situation.

TESTING A PREVENTIVE-SYMPTOMATIC THEORY OF DENTAL HEALTH BEHAVIOR

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Introduction

MOST dental disease can be controlled only if the individual patient exercises a considerable measure of initiative and responsibility. Therefore, individual motivation toward better oral hygiene and regular professional care is a major key to dental health.[1] The purpose of this paper is to test a preventive-symptomatic theory of health behavior as proposed by Hochbaum, Kegeles and others. The theory attempts to explain that a person who takes preventive health action, as opposed to being driven by symptoms, is the person who is brought to a state of "readiness to act" by holding the three following ideas: (1) that he is susceptible to some disease (that is, the disease is not only for others to get but he, himself, can be affected by it); (2) that disease is potentially serious in its effects on him; and (3) that a course of action to overcome the disease is both available to him and effective. Preventive health behavior, then, is a function, at least in part, of the resolution of conflicts among needs, motives and perceived courses of action.[2]

Kegeles applied these principles to the area of dental health.[3] He conducted three studies which attempted to measure the importance of susceptibility, severity of the problem, and efficacy, as well as various situational barriers and socioeconomic factors.

In the summer of 1963, researchers from the School of Public Health of the University of Michigan completed a national survey of health beliefs in an effort to explore further the variables utilized in the preventive behavior scheme.[4] The major belief variables in that study included the perceived vulnerability to disease; perceived negative consequences of disease; and beliefs concerning the beneficial efforts of preventive, remedial or diagnostic actions which might mitigate against the threat or consequences of disease.

Methodology

The present research seeks to test out the effect of these preventive factors in dental health behaviors on a body of public opinion data collected by the National Opinion Research Center in 1959. That study queried a geographic probability sample of 1,862 American adults, 20 years of age and over, in lengthy interviews dealing with various aspects of dental health attitudes and behavior.

This paper is a "secondary" analysis

of data which was originally collected for other purposes. This is an important caveat because the operational definitions limp in a few places. By and large, however, the NORC data have been equal to the needs of operationalizing the factors relevant to the preventive-symptomatic theory.

Dependent Variable

The dependent variable in this analysis is a preventive-symptomatic typology of use of the dentist. Table 1 shows the two major variables making up that typology: recency of the last dental visit and motivation for that visit. That is, those people who reported very recent dental visits (within the past year), and who went to the dentist for a preventive reason (such as for a regular checkup or prophylaxis), were grouped as "preventives" (Category 1). Those who had been to the dentist three or more years ago, and who went at that time because something specific was bothering them, were classified as "symptomatics" (Category 8). Four hundred eighty-eight respondents, or 26 per cent of the total sample, were preventives, and 392 or 21 per cent of the total were symptomatics. The rest fell somewhere in the six categories between, including people who had not gone to the dentist since they began to wear false teeth. Because those with natural teeth only were not separated from the typology, the latter combined category in fact resembles the symptomatic category. (Almost half of those who had lost all of their teeth reported going to the dentist for symptomatic reasons. Only 6 per cent went for a checkup.)

Hypothesis I[5]

The first hypothesis tested was that *persons who felt susceptible to dental disease would be more likely to seek preventive dental care than persons who did not feel susceptible.*

To define susceptibility, respondents were categorized on the basis of how they answered two questions. One question asked for an estimate of how much dental work they thought they needed now; the other, their estimate of how much work they thought they would need a year from now.

Susceptibility, as defined in this way,

Table 1—Preventive-symptomatic typology—motivation of dental visit* and recency of last visit (N=1862)

Recency of last visit	Check up			Only when needed			Have not gone since false teeth or have never gone		
	f	%	Index category†	f	%	Index category†	f	%	Index category†
1959	488	26	1	305	16	5	9	*	9
1958	95	5	2	161	9	6	14	1	9
1957	28	2	3	120	6	7	10	1	9
1956 and Pre 1956	25	1	4	393	21	8	161	9	9
							28	2	Rej.
							25	1	0

* Based on:
"Do you go to a dentist only when you know you need dental work done or have a tooth bothering you, or do you sometimes go for a dental check-up even when you don't think anything is wrong?"
† Index category refers to preventive-symptomatic category. Category 1 indicates those most preventively oriented. Category 8 indicates those most symptomatically oriented.

is *irregularly* related to preventive use of the dentist. People with "low susceptibility" were more likely to use the dentist preventively (66 per cent) than either those who felt highly susceptible (34 per cent) or those who were categorized as having had no feelings of susceptibility (37 per cent).

Why this should indeed be the pattern is a question for interpretation. Briefly, it is speculated that the answer may lie in the meanings people give to dental care's role in disease prevention. Thus, people who go regularly to the dentist may expect that care will maintain their oral health; hence they do not feel greatly "susceptible." In other words, care itself may affect feelings about susceptibility.

Hypothesis II

The second hypothesis was that *persons who believed in the seriousness of dental disease consequences, should they contract such a disease, would be more likely to seek preventive care than persons who did not believe in the seriousness of dental disease consequences.*

Seriousness was measured by means of an index based on agreement-disagreement statements concerning the value placed upon natural teeth and their retention. Those persons who placed little value on such items were classified as "low serious" and, conversely, those who valued natural teeth were the "high serious." In the low serious group only 8 per cent were preventively oriented, while in the high serious group 41 per cent were preventively oriented.

Hypothesis III

The third hypothesis was that *persons who believed in the benefits of taking preventive dental action would be more likely to seek preventive dental care than persons who did not believe in the benefits of taking preventive dental action.*

The two items used to measure efficacy, or benefits of regular dental care, were concerned with belief in the utility of keeping one's teeth and gums in clean condition. The resultant index of efficacy, when cross-tabulated with the preventive-symptomatic typology, indicates that 28 per cent of the high efficacy respondents were in the preventively oriented category and 22 per cent of the low efficacy respondents were in the preventively oriented category. However, the percentage differences are not great and a chi square test indicates ($P \ (\chi^2=4.15)<.50$) that the differences are not statistically significant.

Hypothesis IV

The following hypotheses concern two variables which are thought to act as barriers to dental care: cost of dental treatment and fear of pain.

The first of these states that *persons who perceived dental care as costly would be less likely to seek preventive dental care than persons who do not perceive such care as costly.*

The two items used to measure economic motivation concerned the belief that adequate dental care costs more than it is worth. There is a definite, positive relationship between preventive orientation and position on the economic barrier index. Only 7 per cent of those who perceived a substantial economic barrier were preventively oriented, while 36 per cent of those who perceived a lesser economic barrier held a preventive orientation. It can be concluded that persons who perceived dental care as costly were less likely to seek preventive dental care than persons who did not perceive dental care as costly.

Hypothesis V

In addition, it was hypothesized that *persons who believed that dental care would cause pain would be less likely to seek preventive dental care than per-*

sons who did not believe that dental care would cause pain.

Pain and fear expectations were measured by means of a direct question concerning amount of fear and/or pain expected upon visiting dentist. In order to place the respondents as having or not having fear of pain, those who made any reference at all to pain or fear on the open-ended question were considered separately from those who made absolutely no reference at all to pain or fear.

Twenty-nine per cent of those with expectation of pain and/or fear were in the preventively oriented category while 36 per cent of those having no expectation of pain and/or fear were preventively oriented. Though the percentage differences seem small, the relationship is significant at the .02 level ($P\ (\chi^2=8.00)<.02$) and is in the expected direction. Those categorized as less fearful of pain tended more to visit the dentist preventively than those who expected pain during their dental visit.

Hypothesis VI

It was hypothesized further that *persons who had relatively more knowledge of dental health would be more likely to seek preventive dental care than persons who had relatively less knowledge of dental health.*

Three factual questions relating to care of baby teeth, development of teeth and tooth mortality, were used to construct a "dental knowledge" index.

In terms of the typology, 8 per cent of those in the low knowledge group were preventively oriented while 44 per cent of those in the high knowledge category were preventively oriented.

Hypotheses VII-XIV

The following hypotheses deal with the effects of various social and economic characteristics in preventive-symptomatic use of the dentist.

Women would be more likely to seek preventive dental care than men.

Younger persons would be more likely to seek preventive dental care than older persons.

White persons would be more likely to seek preventive dental care than Negroes.

Persons from an urban background would be more likely to be preventively oriented than persons from a rural background.

Persons of greater education would be more likely to be preventively oriented than those of less education.

The greater the family income, the more likely would persons seek preventive dental care.

The greater the standard of living of a person's family, the more likely that person would seek preventive dental services.

Results permit the acceptance of all the preceding hypotheses.

To summarize the results thus far, most every variable from the social-psychological theory of preventive health behavior has shown itself capable of explaining at least some of the differences between people who did and did not go to the dentist frequently and those who went for preventive reasons. Of course, some factors may not have independent effects but may be interrelated with each other.

The task is now to examine these factors in various combinations. Results of such analysis are summarized in Table 2. Almost every variable, when examined simultaneously with every other like factor, turns out to be independent. The susceptibility variable is dropped from further analysis because of the apparently ambiguous results already mentioned. The effect of the psychological factor of efficacy dropped because it was not statistically significant. The result is that the 13 separate factors in preventive-symptomatic orientation can be reduced by two.

How powerful are the variables remaining in the theory in explaining preventive

Table 2—Summary of psychological factors* and social factors† (N=1320)‡

Social factors		Psychological factors: Low → High 1 f	1 %	2 f	2 %	3 f	3 %	4 f	4 %
Low	1	72	40	66	36	34	19	9	5
	2	137	31	133	31	126	29	39	9
	3	61	20	98	32	99	32	47	15
	4	40	15	83	32	78	30	60	23
High	5	15	11	33	24	51	37	39	28

* Psychological Factor Index includes: Expectation of pain, seriousness, dental knowledge and economic barrier.
† Social Factor Index includes: Sex, education, race, age, income, socioeconomic status and urban-rural background.
‡ Less 542=125 (No answer on one or more questions in Social Factors Index)
458 (No answer on one or more questions in Psychological Factors Index)

dental visits? All the psychological and all the social factors can be summated and the resulting two indexes can be related to the preventive-symptomatic typology. This is done in a crude way by scoring *plus one* for each hypothesized characteristic of each respondent, and assigning to every respondent a total score on the social and psychological dimensions. The results are presented in Tables 3 and 4. Both tables show similar ranges of differences. People low on either the proper psychological dispositions and perceptions, or lacking in the appropriate social characteristics (as defined by our hypotheses), were considerably less likely to hold a preventive orientation toward the use of the dentist than people rated high on each composite variable.

Table 3—Summary psychological factors index and preventive-symptomatic typology (N=1404)*

Preventive-symptomatic typology	Psychological index: Low → High 1 f	1 %	2 f	2 %	3 f	3 %	4 f	4 %
Preventive orientation (Category 1)	48	14	117	27	188	45	122	60
Symptomatic orientation (Category 8)	113	32	81	18	66	16	11	5
Other categories combined	187	54	238	55	162	39	71	35
Total	348	100	436	100	416	100	204	100

* Less 458=No answer on one or more questions in Psychological Factors Index.

In addition, the social factors are related to the psychological factors. When social and psychological indexes are run simultaneously against the preventive-symptomatic typology (Table 5), there is clear evidence that the two sets of factors have independent effects upon preventive orientation to dental care. There is striking evidence of the power of the two indexes to "predict" how people will distribute on the dependent variable, i.e., who would hold preventive, who would hold sypmtomatic orientations. People low on both indexes together had almost zero probability of being preventively oriented, while 3 out of 4 of those people rated high on both were likely to be preventive.

Summary

In identifying and demonstrating about a dozen variables that can determine preventive versus symptomatic use of the dentist, a few public health education propositions present themselves.

An obvious conclusion is that use of the dentist for preventive care is not a simple behavior. It is related to many factors, each of which may be thought of as predisposing or motivating, but no one of which explains everything. Thus, it is not simply a matter of being "dentally uneducated," or not having the money, or not being middle class, or whatever. This multiplicity of factors suggests that any program aimed at increasing preventive use of the dentist ought to span the several appeals and factors shown to be relevant. Dental health education has not systematically taken advantage of the knowledge at hand.

Profitable efforts to increase preventive dental health behavior, namely visiting the dentist regularly for checkups, might focus on messages which would increase feelings about the severity of dental diseases, increase the awareness that something can be done to overcome dental disease problems, decrease some of the economic barriers to obtaining dental services and enlist the support of those social and economic groups who are already positively oriented toward preventive dental health. Such groups would include women, younger persons, whites, urban residents, the more educated, those of higher incomes and those with higher standards of living. These people may act as communicators of dental health knowledge and may influence preventive actions in others.

Table 4—Summary of social factors index and preventive-symptomatic typology (N= 1737)*

	Social index									
	Low → High									
Preventive-symptomatic typology	1		2		3		4		5	
	f	%	f	%	f	%	f	%	f	%
Preventive orientation (Category 1)	12	4	98	16	130	35	126	44	84	60
Symptomatic orientation (Category 8)	138	42	154	25	44	12	25	9	11	8
Other categories combined	174	54	367	59	193	53	136	47	45	32
Total	324	100	619	100	367	100	287	100	140	100

* Less 125=No answer on one or more questions in Social Factors Index.

Table 5—Summary indexes of social and psychological factors and preventive-symptomatic typology (N=1320)*

Social factors × Psychological factors	Preventive-symptomatic typology							
	Preventive orientation (Category 1)		Symptomatic orientation (Category 8)		Other categories combined		N	Total %
	f	%	f	%	f	%		
1. Low								
Low 1	1	1	39	54	32	45	72	100
2	6	9	25	38	35	53	66	"
3	4	12	19	56	11	32	34	"
High 4	—	—	1	11	8	89	9	"
2. Low medium								
Low 1	13	9	50	37	74	54	137	"
2	28	21	30	23	75	56	133	"
3	27	34	22	17	70	56	126	"
High 4	18	46	6	15	15	39	39	"
3. Medium								
Low 1	13	21	9	15	39	64	61	"
2	33	34	8	8	57	58	98	"
3	53	54	11	11	35	35	99	"
High 4	28	60	2	4	17	36	47	"
4. High medium								
Low 1	8	20	11	28	21	52	40	"
2	26	31	7	9	50	60	83	"
3	49	63	5	6	24	31	78	"
High 4	41	68	—	—	19	32	60	"
5. High								
Low 1	7	47	2	13	6	40	15	"
2	17	52	5	15	11	33	33	"
3	31	61	3	6	17	33	51	"
High 4	29	74	1	3	9	23	39	"

* Less 542=no answer to one or more questions in Social and Psychological Factors Indexes.

It should be emphasized, in conclusion, that changing the public's behavior patterns vis-a-vis dental care involves a composite of interrelated factors. Attempting to solve the problem by resorting to any one of these alone, such as the current trend toward removing economic barriers, may show some success initially. In the long run, however, public health attention needs to focus not only on the economic factors but also on the psychological and social forces affecting motivation.

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5. Because of space limitations associated with publishing this paper, tables showing specific percentage distributions for Hypotheses I-XIV will be made available upon request from authors.

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Social Determinants of Diseases

In most cases genetic endowment and racial origin play only a small role in determining the types and severity of the diseases most prevalent in a particular region or a particular social group. Whether they be African, American Indian, European, or Oriental origin, and whatever the complexity of their racial mixtures, human populations usually acquire the burden of diseases characteristic of the geographical area and of the social group in which they are born and live.

René Dubos: *Man, Medicine, and Environment.* New York: Frederick A. Praeger, Publishers, 1968, p. 94.