Consistency in Children's Perceptions of Vulnerability to Health Problems

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AGE, sex, and socioeconomic factors are usually considered to be powerful determinants of most behavior with which health professionals and social scientists are concerned. But the research process is often so committed to uncovering differences accounted for by these factors that important underlying similarities are overlooked. Yet these similarities may have implications for the planning of successful health education programs and for increasing the utilization and effectiveness of health services.

Earlier research conducted by Gochman (*1,2*) revealed that children and young adults exhibit consistency in their expectancies of health problems in two ways: (*a*) the degree to which a child expects some specific illness, accident, or other health problem is related to the degree to which he expects other such problems, and (*b*) the degree to which some specific health problem is expected by one age-sex group is markedly related to the degree to which it is expected by other age-sex groups. The studies conducted by Gochman in 1967 and 1968 established, replicated, and extended these observations, but did not explore the effects of socioeconomic differences on the consistency of these patterns. Moreover, Bagramian and Sheiham suggested the possibility of determining whether such consistency also extended to dental problems. Accordingly, one major goal of the current study was to examine the effects of socioeconomic status, as well as those of sex and age, on a variety of health and dental problems.

In addition, several psychological theories of child development suggest that younger children exhibit less interdependence in their belief systems, that is, a lesser degree of relationship among

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component beliefs than do older ones. A major goal of the current study was also a closer examination of the derivative hypothesis that younger children manifest less consistency in their expectancies of health problems than do older ones.

Subjects and Method

A sample of 774 children was obtained through the school system of a large city in the Great Lakes area. At grades three through six, one class was obtained in each of four schools, two located in the inner city and two in non-inner city areas. For grades seven through nine, two classes at each level were obtained in an inner city and two in a non-inner city junior high school. Of these children, 429 were white and 321 nonwhite (data on race were not available for 24); 402 lived in non-inner city areas and 372 lived in the inner city. About half (397, or 51.3 percent) were boys and half (377, or 48.7 percent) were girls. A total of 28 classes, four at each of seven grade levels was thus obtained.

The children's expectancies of health and dental problems were assessed through their responses to a series of 15 questions, such as "What chance is there of your getting the flu during this next year?" The expectancies dealt with a bad accident, a rash, a fever, having a tooth pulled, a sore throat, flu, a toothache, a cold, bleeding gums, an upset stomach, missing a week of school because of sickness, a cavity, a bad headache, breaking or cracking a tooth, and cutting a finger accidentally. The questionnaire was administered during regularly scheduled class time.

For each item, a youngster was instructed to select the one response from seven alternatives that best expressed his expectancy—no chance, almost no chance, a small chance, a medium chance, a good chance, almost certain, or certain. The responses were scored from 1 for the "no chance" alternative to a maximum of 7 for a response of "certain."

Results

Consistency in expectancies. Pearson product-moment correlation analyses (*3a*) were performed to determine the relationships between a child's expectancy of one health problem and his expectancies of others. The correlations were statistically significant in 101 of the total 105 possible pairs of expectancy items; 96 of these were beyond the .0005 level of confidence.

When the sample was subdivided into inner city and non-inner city groups, boys and girls, children under 12 years and those 12 and over, the significance of these correlations remained.

To test the hypothesis that the degree of consistency in expectancies of younger children is lower than that in older children, a measure of individual consistency was obtained by using the average deviation around the mean of a child's 15 expectancy scores. A high average deviation score reflects low consistency and a low average deviation score reflects high consistency.

The mean consistency score for the 357 children under 12 was 1.37; that for the 393 children 12 or older was 1.24 (age data were missing for 24). A *t*-test analysis (*3b,4*) revealed this difference to be significant ($t = 3.42$, $P < .0005$). Significant differences were also observed in analyses performed separately for inner city and non-inner city children. Relatively less consistency exists within the younger child's expectancies than within the expectancies of older children. No significant differences in consistency scores were observed between inner city and non-inner city children.

Interesting differences emerge, however, when dental and nondental consistency scores are considered separately. Significant differences among nondental expectancies are still observed between children under 12 years and those 12 or older ($t = 4.48$, $P < .0005$). For dental items, this difference virtually disappears.

Consistency in expectancy patterns. The mean levels of expectancy for each health problem

Table 1. Mean expectancy scores for total sample of 774 children

Expectancy of—	Mean	Rank
Breaking tooth	3.03	1
Accident	3.24	2
Having tooth pulled	3.42	3
Missing school because of sickness	3.52	4
Flu	3.63	5
Rash	3.66	6
Bleeding gums	3.72	7
Toothache	3.82	8
Cavity	4.18	9
Fever	4.51	10
Sore throat	4.71	11
Cold	4.91	12
Cutting finger	4.98	13
Headache	4.99	14
Upset stomach	5.16	15

NOTE: The expectancy scores themselves range from 1 (lowest) to 7 (highest); the means are then ranked from 1 to 15.

within the entire sample are presented in table 1. The children perceived the breaking or cracking of a tooth as least likely among all the health problems and having an upset stomach as most likely.

The consistency of this pattern of expectancies was analyzed through rank correlations. The mean scores for each expectancy were computed separately for youngsters under 12 years of age, for those 12 and older, for boys, for girls, for inner city, and for non-inner city children; the scores were then ranked within each group. The correlation coefficient (*5*) for the two sets of rankings by age was .97, a figure indicating nearly perfect agreement between the rankings of the two age groups ($P < .01$). The correlation computed for the two sets of rankings by sex was .95, a figure again indicating extremely high agreement ($P < .01$). The correlation computed between the two sets of rankings by area of residence was .84, a figure indicating marked agreement ($P < .01$). To determine whether the same pattern existed when age, sex, and area of residence were considered conjointly, the sample was divided further into 16 groups according to sex, area of residence, and four levels of age (under 10 years, 10–11, 12–13, 14 and older). Table 2 presents these rankings. The coefficient of agreement (*5*) was .79, a figure indicating marked agreement among the 16 different sets of rankings ($P < .001$).

Age, sex, and residence. A multiple analysis of variance (*3c*) showed sex, age (using four different levels), and area of residence to be important determinants of the mean expectancy of health problems. Girls had significantly higher expectancies than boys, older children higher expectancies than younger ones, and children not from the inner city had higher expectancies than those in the inner city. Moreover, a significant interaction between age and area of residence in-

Table 2. Rankings of expectancies for inner city and non-inner city children, by sex and age groups

Expectancy of—	Boys				Girls			
	Under 10	10–11	12–13	14 and over	Under 10	10–11	12–13	14 and over
	Inner city children							
Breaking tooth	1	2	5	1	4.5	2	2	5
Accident	2	3	3.5	2	1	1	1	1.5
Having tooth pulled	12	9	8	7	9	7	6.5	7
Missing school because of sickness	7.5	6	3.5	4.5	2	4	8	1.5
Flu	3	1	1.5	4.5	4.5	6	6.5	6
Rash	9	5	1.5	6	7	3	3	4
Bleeding gums	4	4	7	3	3	5	4	3
Toothache	10	10	6	8	11.5	9	5	9
Cavity	7.5	7	9	9	11.5	8	9	8
Fever	13	8	10	10	15	12	10	10
Sore throat	6	11	12	11	6	10	12	11
Cold	14	13	13	13.5	11.5	14	14	13
Cutting finger	5	14	15	13.5	11.5	11	11	12
Headache	11	12	11	12	8	13	13	14
Upset stomach	15	15	14	15	14	15	15	15
	Non-inner city children							
Breaking tooth	1	2	1	2	1	1	1	2
Accident	3	5	3	4	3.5	2	3	4
Having tooth pulled	2	1	4.5	1	3.5	3	2	1
Missing school because of sickness	6	4	2	3	2	4	6	6
Flu	4	7	4.5	8	7	5	9	9
Rash	8	6	6	5	6	6.5	7	7
Bleeding gums	7	9	8	7	8	9	5	3
Toothache	5	3	7	6	5	6.5	4	5
Cavity	10	8	9	9	9	8	8	8
Fever	9	10	10	10	10.5	10	10	10
Sore throat	12	11	12	13	12	11	12	14
Cold	11	12	11	12	13	14	13	12
Cutting finger	14	14	15	15	10.5	12	15	11
Headache	15	15	13	14	14	13	11	15
Upset stomach	13	13	14	11	15	15	14	13

NOTE: The expectancy scores themselves range from 1 (lowest) to 7 (highest); the means are then ranked from 1 to 15.

dicates that the effect of these two variables is not merely additive but that they operate jointly to enhance prediction.

For dental problems alone, only age seems to be a direct determinant of the level of mean expectancy; age and sex together interact significantly as determinants. For nondental problems, again sex, age, and area of residence are significant determinants, and age and area of residence interact significantly as predictors.

In addition, overall expectancies of dental and nondental problems were significantly related for the entire sample ($r = .44$, $P < .0005$) and within each subgroup. Consistency levels within dental and nondental expectancies were also significantly related for the entire sample ($r = .43$, $P < .0005$) and within each subgroup.

Discussion

Dental and nondental expectancies. One important result of this research is revealed when the levels of expectancy of, and the consistency within, dental and nondental problems are compared. Such contrasts help explain the lack of an increase in consistency among the child's expectancies of dental problems as he develops. Children show significantly lower expectancies of dental than of nondental problems (3.63 compared with 4.33; $t = 16.44$, $P < .000001$). They also show significantly higher levels of consistency among expectancies of dental than nondental problems (1.12 and 1.20; $t = 3.67$, $P < .0003$). Similar significant differences are found separately for inner and non-inner city children and for children under 12. Among children 12 or older, only the difference in levels of expectancy is significant. In this group, the consistency levels for dental and nondental problems are virtually identical.

In younger children, the consistency in their expectancies of dental problems was already appreciably higher than in their expectancies of nondental problems. Thus, the increased interdependence within belief systems that theoretically develops as children grow older will have a greater chance of affecting older children's expectancies of nondental problems and thus may elevate the degree of consistency in these expectancies to the level already attained at some earlier age in their expectancies of dental problems.

At some age beyond the lower limit of the sample observed, children apparently acquire a perceptual pattern of health problem expectancies that remains stable over time. In none of these studies is there evidence that differentiation of the sex role in later childhood and adolescence or chronological development appreciably affects this pattern. The present study indicates, as well, that socioeconomic status (defined in terms of inner city or non-inner city residence) has no appreciable effect on the pattern.

Rokeach (*6*) has suggested that central beliefs, such as those about authority, the physical world, and the self, emerge very early in life, remain unquestioned, and appear self-evident to the person holding them. If beliefs about health problems represent some intersection of beliefs about the physical world and about the self, then it is understandable that these beliefs emerge early and remain relatively unchanged.

Perceived vulnerability. Another important result is the continued replication of previous observations that, in boys as well as in girls and in younger as well as in older children, the degree to which a child expects some given health problem is related to the degree to which he expects other such problems. Moreover, such observations are obtained in children from inner city as well as from non-inner city areas. These results attest to the appropriateness of using overall expectancy scores for health problems in general, as well as for dental and nondental problems. It also strengthens the assertion that perceived vulnerability to health problems is a general personality characteristic that is readily measurable by overall expectancy scores and is a characteristic which should become a focal point for systematic research. It becomes reasonable at this point, moreover, to use the phrase "perceived vulnerability" rather than "mean expectancy of health problems."

The significant correlations between the levels of perceived vulnerability to dental and nondental problems indicate that the child who perceives himself as relatively likely to encounter nondental problems sees himself as also being relatively likely to encounter dental problems, although the actual degree of perceived vulnerability to dental problems may be lower. Together with the significant correlations between the levels of consistency within the expectancies of dental and nondental problems, these observations suggest that the organization or patterning of the two types of beliefs are similar and that whatever psychological factors are responsible for the level of perceived vul-

nerability to one type of health problem may be similarly responsible for the other.

What are the antecedents of perceived vulnerability? Is it simply rooted in a person's history of health problems, or is it some form of, or otherwise related to, anxiety and its concomitant, free-floating fear? How does perceived vulnerability relate to aspects of health behavior? At what age does it begin to assume the stable organization exhibited in the research reported here and elsewhere?

Analyses and research, both in progress and projected, should provide some answers to these questions.

In contrast to the similarities in patterns of health problem expectancies in different sex, age, and socioeconomic groups, scores for the actual levels of perceived vulnerability do vary among these groups. The failure of earlier research (*1,2*) to reveal these relationships can be attributed both to the relatively small sizes of the earlier samples and their greater homogeneity.

That older children show higher levels of perceived vulnerability than do younger ones is not surprising. While the infant and very young child may perceive himself as being omnipotent and invulnerable to threats and dangers, part of the child's normal developmental process entails his coming to terms with pain and stress and recognizing that these may be part of his experience.

The sex differences in perceived vulnerability are also not surprising. It is apparent that the socialization processes in contemporary American society operate differentially upon the sexes. Girls are less likely than boys to be rewarded for rough and tumble, independent behavior; they are more likely to be rewarded for "careful," polite dependency (*7a*). This reinforcement tends to lead them to be overly concerned and anxious about many aspects of their experience, particularly health and illness. Moreover, they are prone to admit more freely to these concerns and anxieties than are boys. Mussen and co-workers (*7b*) report some evidence—although not conclusive—that neonate girls have somewhat lower thresholds of pain than neonate boys. To the extent that such evidence is replicated, it might serve as a basis for understanding the sex difference observed in the expectancies of health problems. Girls are more sensitive than boys to potential pain and stress.

What is most interesting is that children in the inner city have significantly lower expectancies of encountering health problems than children in non-inner city areas (3.94 compared with 4.25) and significantly lower nondental expectancies (4.07 compared with 4.57). At first glance one would surmise that accessibility to, and availability of, health services would have some effect on whether a child experienced illness and health problems, that inner city children would have had more frequent health problems than non-inner city children, and that such encounters and experiences would have led to a greater degree of anticipation of similar problems. While no information was obtained on the children's past history of general health problems, inner city children reported to a far greater extent than did non-inner city children that their last dental visit was made because of trauma, but children from the inner city exhibited no differences from non-inner city children in their expectancies of dental problems. These results are consonant with inferences that can be made from evidence already available (*8*) showing that the population sampled in the inner city would have lower expectancies than that sampled in non-inner city communities.

Age and consistency. A third important observation, that older children exhibit higher degrees of consistency than do younger ones, particularly among nondental expectancies, also supports and corroborates previous research (*2*), but the exact nature of the functional relationship between age and consistency remains undetermined and is probably nonlinear.

Implications

People's perceptions of their vulnerability to health problems are relevant to public health professionals, particularly to health educators and planners of health services, in a number of ways, but primarily as important determinants of specific health actions. The health-belief model (*9*) suggests that the likelihood that a person will take some preventive or adaptive step is a function, among other things, of the degree to which he sees himself as being susceptible (vulnerable) to some health problem. Accordingly, attempts to induce some particular health behavior should depend, in part, on changing the level of the person's perceived vulnerability. Haefner and Kirscht (*10*) present evidence of this relationship while at the same time indicating how difficult it is to alter perceived vulnerability in any large measure.

The observed consistency in a person's expectancies of health problems indicates that perceived vulnerability has a coherence and stability of its

own. Consequently, attempts to modify individual components of it, for example, expectancies of particular health problems, are likely to be unsuccessful. There is substantial psychological evidence that interdependent, or consistent, belief systems are remarkably resistant to this type of change (*6*). On the other hand, attempts to alter the overall level of perceived vulnerability by focusing on a large number of its components in some rational way might be more successful. Health educators might profitably channel their energies into programs and communications directed toward such a multi-problem attack.

Such multi-problem attacks on perceived vulnerability, however, might have to begin at a very early age, perhaps even in kindergarten or in preschool settings. If beliefs about vulnerability do, in fact, represent a group of central, "primitive" beliefs, it is highly unlikely that they will change as readily during later childhood or in the adult years.

The significantly lower levels of perceived vulnerability to dental problems, in comparison with the levels for nondental problems, in the total sample, among inner city and non-inner city children, and among younger and older children have implications for dental health educators, as does the higher consistency observed within the dental problem expectancies of all but the older children. Possibly, expectancies of dental problems are coherently organized around a level of perceived vulnerability that is too low to permit a ready shift to a higher level or to facilitate the adoption of some desirable form of dental health behavior.

Results of the current study suggest that dental health communications and programs of dental health education might appropriately be embedded within an overall health education program.

As a person's age increases, so do the levels of perceived vulnerability. To health educators, these increases suggest that older children, particularly those 12 years and over, may be more amenable than younger ones to accepting health communications that are designed to elicit some preventive or adaptive behavior. (Of course, older children may also have greater levels of control over their own behavior than younger ones.) Since the relationship between age and consistency is not linear, it is hoped that longitudinal research in progress may reveal the particular ages at which some combination of the level of perceived vulnerability and the consistency of perceived vulnerability to various problems offers the greatest promise for acceptance of health messages.

In addition, for children 12 and older, the average score for perceived vulnerability was 4.25, indicating only a slight tendency to perceive susceptibility to health problems. Even more important, however, is the significantly lower level of vulnerability perceived by children of the inner city. This lower level indicates that large segments of the population who are most in need of health services are not psychologically disposed to use such services. Whether such psychological dispositions reflect psychological defenses erected by this social group to facilitate coping with its all-too-threatening real health problems or reflect a set of norms acquired through socialization cannot be determined from available data. What does emerge to confront health professionals is the question of how to increase levels of people's perceived vulnerability so as to enhance their utilization of health services.

Since the current report deals with the third study in a series of continuing investigations, a suggestion that this study or any of the preceding ones might have yielded spurious, nonreplicable results becomes exceedingly untenable. The existence of organized patterns of health problem expectancies in individual children and in different groups of children seems to be an established, repeatably demonstrable set of events. Clearly, the health beliefs considered in this report manifest the same psychological property of interdependence as do other components of belief systems. Psychologists should therefore overcome the inertia they frequently exhibit in dealing with general health, in contrast to the energy they show in dealing with mental health or psychosomatics, and begin to explore health-related behavior as a meaningful human process.

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A study in May 1969 continued to replicate and extend research dealing with children's perceptions of their vulnerability to health problems. Responses of 774 children, 8 to 17 years old (372 from inner city areas and 402 from non-inner city areas), to 15 questions about the likelihood of encountering various health problems confirmed previous results indicating that perceived vulnerability is consistent across health problems. As in previous research, perceptions of vulnerability were predictably less consistent in younger children than in older ones. Moreover, a consistent pattern of expectancies was found that was not affected by age, sex, or socioeconomic factors (area of residence).

These results have relevance for public health professionals who are concerned with the content and timing of educational programs. For example, evidence continues to suggest that health educators who are interested in heightening children's perceptions of their vulnerability to health problems might find it appropriate to deal with a child's entire set of such perceptions rather than with the expectancy of one particular problem. Moreover, there is some evidence to suggest that dental health education programs should be part of a comprehensive health education program.