

A Prospective Study of Medical Care Utilization and Morbidity in Preschool Children Belonging to a Prepaid Group Practice: Background and Methods

HAL MORGENSTERN, Ph.D.,^a SARAH M. HORWITZ, Ph.D.,^b
AND LISA F. BERKMAN, Ph.D.^b

^a*Division of Epidemiology, University of California—Los Angeles School of Public Health, Los Angeles, California;* ^b*Department of Epidemiology and Public Health, Yale University School of Medicine, and Institution for Social and Policy Studies, Yale University, New Haven, Connecticut*

Received April 21, 1986

The purpose of this paper is to describe the background and methods of a prospective study of medical care utilization and morbidity in a fixed cohort of over 500 preschool children whose families belonged to a prepaid group practice affiliated with Yale University. Following baseline interviews with their mothers, study children were followed for 12 months between 1981 and 1982. Information concerning the subjects' contacts with the health care facility serving members of the group practice was collected from accompanying adults, attending clinicians, and medical records. Using these data, we were able to identify episodes of care, linking all clinical visits and phone calls for single occurrences of an illness or injury. The major aim of the study is to identify psychosocial determinants of pediatric utilization (for both acute and preventive care) and of childhood morbidity. The possible predictors of principal interest are factors associated with the family environment, such as social stress and strain, family structure, and different aspects of the mother's social network. The dual emphasis on both illness and behavior outcomes is based on the important interrelationship between epidemiologic and health services research, especially when examining psychosocial effects.

INTRODUCTION

We have conducted a prospective follow-up study of over 500 young children whose families belonged to a prepaid group practice in New Haven, Connecticut. The major aim was to identify psychosocial determinants of childhood morbidity and utilization of pediatric services. This dual emphasis on both disease and behavior reflects the evolving integration of epidemiologic and health services research, which is beginning to shape research strategies in both disciplines [1-5]. We believe that such a multidisciplinary approach represents the most informative way of studying both illness and utilization because of several methodologic and substantive issues [6,7]. Most important among these are, first, that certain psychosocial factors are thought to influence both disease occurrence and medical care utilization [8-10] and, second, that classification of disease status and measurement of symptom severity are typically confounded with certain illness behaviors, such as symptom recognition, care seeking, and symptom reporting [11-13].

The purpose of this paper is to describe the background and methods of our pediatric investigation. Specific analyses and findings will be presented in future publications.

599

This project was supported by a grant (No. 81076381) from the W.T. Grant Foundation.

Address reprint requests to Dr. Hal Morgenstern, Division of Epidemiology, UCLA School of Public Health, Los Angeles, CA 90024

Copyright © 1986 by The Yale Journal of Biology and Medicine, Inc.
All rights of reproduction in any form reserved.

BACKGROUND

Pediatric Medical Care Utilization

There is much empirical evidence to support the effect of psychosocial factors on medical care utilization in adults [14–16] and some evidence to support such effects in children [9,17]. Specifically, pediatric utilization has been linked with socioeconomic status and ethnicity [18–21], family size and birth order [19,20], maternal employment and family structure [22,23], mother's health beliefs [24–26], and family stress [27–29]. These findings are often inconsistent across studies, however, and typically psychosocial predictors are tested in isolation from each other [6,13]. Consequently, it is difficult to rule out confounding effects, interaction effects, chance findings, and other methodologic problems. These issues notwithstanding, we believe that many previous findings, including certain apparent inconsistencies, may be partly explained by direct and indirect influences of the mother's social network and support system on pediatric medical care use. Given the relative stability of health service use during childhood [30], we have concentrated our efforts on psychosocial measures that reflect stable differences among individuals or families rather than day-to-day fluctuations within individuals or families.

A major premise of this investigation is that different aspects of the mother's social network can affect her use of pediatric services in three ways. First, social isolation resulting from relatively few or weak ties with friends and relatives may act as a chronic stressor, which enhances a mother's recognition of her child's symptoms [13] and increases her use of pediatric services. We would, however, expect this effect to operate only among very isolated women; thus, it may not be observed in our population of middle-class nuclear families. Second, because we believe that the medical care system performs "latent social functions" in addition to its intended objectives [31], we expect that mothers who derive less social support from their friends and relatives may use more pediatric services. If the lack of support represents a deficiency in personal resources needed to cope with problems, we would expect the effect of social support to be greatest for mothers exposed to more social stressors or for mothers experiencing more psychological distress. Third, because the parents in our study and members of social networks are well educated and "cosmopolitan" [32], we expect that frequent contact and discussion of health matters with network members, who share pro-medical beliefs, will encourage greater use of pediatric services [33]. To the extent that our subjects have different beliefs about the seriousness of their children's symptoms and the use of pediatric care, this effect of network contact on pediatric utilization might depend on the nature or degree of such beliefs [34]. Taken together, these three hypotheses imply that different network/support factors may be positively or inversely related to utilization, depending on other personal and family characteristics.

If, as reported by others, family stress affects medical care use among children, we might expect some of this effect to be mediated by parental perceptions of their child's symptoms. For example, a mother who is distressed or depressed would be more likely to perceive her child's symptoms as severe than would a mother who is not distressed or depressed [13]. This heightened perception of her child's symptoms should then increase her use of pediatric services. Alternatively, the association between parental distress and pediatric utilization might be mediated by changes in the child's health status in response to family stress or by the greater need of distressed parents for social support, both of which could influence utilization behavior [6].

Medical care utilization is a heterogeneous phenomenon involving multiple types of behavior, and each type of utilization behavior may have a unique set of determinants [6,26,35]. Thus, for example, we expect to observe different predictors for preventive care visits, initial acute care visits, follow-up visits, and telephone contacts. To the extent that this hypothesis is correct, we would not expect to find a positive association between rates of preventive and acute care visits, as reported by others [36]. In fact, the two rates could be negatively correlated for young children who are often treated for acute symptoms during routine well-child visits. In addition, we expect to find that telephone calls to clinicians by parents concerned about their children's symptoms will reduce the probability of a subsequent visit.

Childhood Morbidity

Although much less research on the health effects of psychosocial factors has been done with children than with adults, there is some evidence linking stressful life events and chronic family stress with various types of childhood illness [18,37–41] and especially injuries [42–49]. Despite the consistency of these findings, however, several methodologic problems limit our ability to make causal inferences. These problems include the usual reliance on retrospective data collection, the questionable reliability and validity of stress measures, the confounded measurement of illness and illness behavior, and the lack of analytic control for extraneous risk factors [7].

Our objective in this study is to test the health effects of several psychosocial factors, including family structure, acute and chronic family stressors, psychological distress of the mother, and child care arrangements. We also focus, as we do with utilization behavior, on the possible effects of several factors related to the mother's social network. Specifically, we would like to determine precisely what network dimensions—structure, interaction, or support—affect childhood morbidity, whether these effects are modified by other psychosocial or health status factors, and to what extent these effects are common to different conditions. Given the relative lack of previous research in this area, it is difficult to formulate specific hypotheses. Nevertheless, we do not expect to find the same social network/support predictors for both morbidity and medical care utilization.

The outcome events of major interest to us are respiratory illness, otitis media, and injuries. An important objective for each outcome is to integrate our assessment of psychosocial, behavioral, and environmental effects that often get confounded in non-experimental research. For example, deleterious effects of parental smoking habits, especially maternal smoking, have been reported for acute respiratory symptoms in children [50], chronic respiratory conditions [51], pulmonary function [52], and childhood disability [53]. While these findings may, of course, reflect true biological effects of passive smoke exposure on respiratory health, there are also other possible explanations. First, parental smoking may enhance the development of respiratory symptoms in the parents, which in turn increases the risk of infection in their children [50]. Second, the observed effect of passive smoking may be confounded by certain psychosocial factors, such as family stress, which is thought to affect respiratory infection in children [37,40] and is likely to be related to parental smoking. Third, since most previous studies relied on medical record data or parents' reports of childhood illness to measure respiratory outcome, the observed effect of parental smoking may have been due to differences in illness behavior, including the greater use of pediatric services by smoking parents than by nonsmoking parents [54].

METHODS

The present study is a prospective follow-up investigation of a fixed cohort of young children whose families belonged to the Yale Health Plan, a prepaid group practice affiliated with Yale University. This type of source population was chosen to minimize the influence of economic factors on access to care and to enhance the feasibility and efficiency of data collection. Subjects were followed for 12 months to collect information on the use of medical services and to link this information with the occurrence of illness and injury.

The source population consisted of all families belonging to the Yale Health Plan on September 1, 1981, and having at least one child under the age of five on December 31, 1981. In families with more than one eligible child, a single subject was randomly selected. Of the 598 families who met these criteria, 65 refused to participate and one withdrew immediately after the intake interview, leaving 532 mother-child pairs (89 percent participation rate). We subsequently determined that all but 19 of these children used the Yale Health Plan as their regular source of care and that very few regular users had any contact with other medical providers during the follow-up period. Thus, the effective sample size for most of the major statistical analyses is 513.

Between June 16 and October 30, 1981, the mothers of all study children were interviewed by three specially trained female interviewers who were not informed of the study objectives or hypotheses. Each baseline interview lasted about 45 to 60 minutes and included information on numerous demographic and psychosocial factors. Within 24 hours of the interview, information was abstracted from the child's medical record at the Health Plan by a research assistant, who marked the chart of each child for future identification.

Whenever a subject visited the Pediatrics department during the next year, the date and purpose of the visit were recorded by the research assistant. If the purpose of the visit was to deal with diagnosed illness, clinical symptoms, or injury (hereafter referred to collectively as acute care), the research assistant asked the accompanying adult a short series of questions before the child was seen by the provider. Later the attending clinician filled out a short encounter form that included a diagnosis of the child's condition. The attending staff in Pediatrics during the study period consisted of five pediatricians and one nurse practitioner who also took most of the incoming phone calls requiring clinical assistance. Since the entire staff met weekly to discuss a variety of matters, including diagnostic standards and treatment procedures, we did not feel that it was necessary to modify or refine further their diagnostic criteria for purposes of this investigation.

For scheduled and unscheduled visits by subjects to Health Plan departments other than Pediatrics, the research assistant abstracted relevant information from the child's chart and from daily intake logs. We also developed a short form for the nurses in Pediatrics to record information from telephone calls made by parents regarding children in our study. This form was quickly adopted for routine use with all symptom-related calls to the Pediatric department. On the basis of information collected from providers, accompanying adults, and medical records, we were able to identify episodes of acute care, linking all visits and phone calls for single occurrences of an illness or injury.

Although no attempt was made to interview or examine children for this study, we collected data from several sources: the child's mother, providers in the Pediatrics

department, the adult accompanying each child to Pediatrics, daily intake logs of after-hours visits, and the child's medical records. In the sections below, we describe the instruments used and variables measured in each of the data collection operations.

Baseline Interview

All eligible mothers who agreed to participate in the study were interviewed, according to their preferences, in their homes (89 percent), their business offices (9 percent), or the New Haven project office (2 percent). Intake interviews were restricted to women for several reasons. First, we did not have the resources available for interviewing both parents in each household. Second, we wanted to avoid the possible problems and biases that could result from interviewing a mixture of mothers and fathers. Third, although men obviously contribute to the family environment, there is little empirical evidence that their behavior or attitudes influence the use of medical care for their young children (e.g., [17-29]). Furthermore, a good deal of information about the father's behavior and role in the family can be obtained from the mother. Fourth, according to the pediatricians and pediatric nurses at the Health Plan, women in most of the families in this population continue to make most of the decisions about the use of health care for their young children. Indeed, we have found that study children were accompanied by their mothers in 85 percent of all acute care visits and by their fathers in only 13 percent of such visits during the follow-up period.

Information was collected on four types of variables: sociodemographic factors, social stressors and psychological distress, social network and support factors, and health beliefs and perceptions.

Sociodemographic Factors Interviewers requested the age, sex, and relationship to the respondent of all household members, including the study child. Also obtained were the respondent's race, religion, marital history, number of children, and pregnancy history. Educational level, current employment status, and occupation were requested for both the respondent and her husband or partner. For the family, we obtained total yearly income, current address, and residential mobility for the past ten years.

Social Stressors and Psychological Distress Separate instruments were used to measure two types of social stressors: acute changes or life events, and chronic situational pressures or strains. To measure stressful life events, we employed a modified version of the Schedule of Recent Experience by Holmes and Rahe [55,56]. Mothers were asked to indicate which of 51 events had occurred in the preceding two years. If an event was reported, they were asked to rate its impact at the time of occurrence on a five-category ordinal scale, ranging from negative to positive. With this information, we were able to construct several life event scores based on different types of events and different scaling approaches [57].

Five scales developed by Ilfeld [58] and by Pearlin and Schooler [59] were used to measure chronic situational strains pertaining to five areas of everyday life: neighborhood (four items), occupation and employment (11 items), financial matters (ten items), homemaking (ten items), and marital relations (20 items). In addition, we developed a three-item scale to reflect the strain associated with parenting. A summary score for each scale was obtained by summing the item responses, most of which were coded on a four-category scale.

To measure the mother's level of psychological distress at baseline, we used the

Center for Epidemiologic Studies Depression Scale (CES-D) [60]. The CES-D is made up of 20 symptoms (items), the frequency of each being rated by subjects on a four-category scale (coded 0–3). An overall index score for each respondent is derived by summing the 20 item scores. The CES-D has been shown to be a reliable and valid measure of depressive symptomatology in both psychiatric and general populations [60–62].

Social Network and Support Factors For purposes of this investigation, an individual's social network was conceived as the set of relevant linkages and bonds that the person has with friends and relatives. Following Mitchell's [63] network theory and recent developments in network analysis [64], we have developed measures of three network dimensions: the *structure* and form of one's network, the type and amount of *interaction* with network members, and the nature and amount of perceived *support* derived from one's network.

The following characteristics were measured to assess network structure: (1) *Size* refers to the number of close friends and relatives with whom the respondent can feel at ease, talk about private matters, and call on for help. In addition, we obtained the number of living parents, in-laws, and neighbors with whom the respondent spends time. (2) *Density* is the extent to which members of the respondent's network know and interact with each other. It was measured as the proportion of the respondent's close friends who know each other and the proportion of her close friends who are also her husband or partner's friends. (3) *Homogeneity* is the extent to which the respondent shares a common life style with her friends. An index of homogeneity was created by summing three scores corresponding to the degree of similarity with respect to marital status, family composition, and occupational status. (4) *Dispersion* refers to the relative geographic proximity of network members to the individual under study. A proximity index was derived by averaging the proximity scores (coded 1–4) for the respondent's parents, in-laws, other relatives, and friends. (5) *Stability* refers to the relative permanence of an individual's ties with network members. It was measured by the length of time the respondent had been residing in her neighborhood and the duration of her closest friendship. In addition to these common structural characteristics, we obtained information about formal and informal child care arrangements and the number of household pets.

To assess the respondent's interaction with her social network, we ascertained the frequency of personal contact, phone calls, and correspondence with network members. This information was obtained separately for parents, in-laws, other relatives, all close friends, and the respondent's closest friend. The subject was then asked whether she discussed her child's health with network members, who was the person most often consulted for advice, and what type of advice this person would give if the respondent's child had specific gastrointestinal symptoms. Also obtained was information about her participation in a variety of social, civic, and religious groups.

Primary measures of network support were based on the respondent's report of how helpful others (excluding her spouse or partner) have been in providing daily task assistance, emotional support, and financial assistance in the past month. The respondent was asked to rate the level of each support function on a five-category scale and to identify the major source of support for each type. From these data, we were also able to quantify the multidimensionality of the network, which is the tendency for the same network members to serve multiple support functions. In addition, respondents were asked about the existence of a special intimate friend, the degree of reciprocity in

giving versus receiving help from neighbors, and their reliance on religious beliefs as a source of support. Lastly, we developed a set of questions to measure the respondent's tendency to use various network members in five hypothetical situations.

Health Beliefs and Perceptions Baseline interviews covered three areas of health-related attitudes: the mother's perceptions of her child's health status, her general beliefs regarding child health and health care, and her perceptions and beliefs about her own health and health behavior.

Several measures of the child's health status were based on the respondent's perceptions and reports of her child's behavior. First, we modified a scale used in the Rand Child Health Perception Instrument [65] to measure the mother's impressions of her child's general health status and illness susceptibility relative to other children. An index score was created by summing the four item scores (coded 1–5). Next, the respondent was asked to indicate whether her child had been diagnosed or treated by a health care provider for each of 42 chronic conditions, most of which were adapted from the health interview survey of the National Center for Health Statistics (NCHS) [66]. Also taken from NCHS were questions regarding physical handicaps and a history of serious illness, injury, and hospitalization. To measure the child's disability level, either of two approaches was used, depending on the child's age. For children two years and older, we obtained the numbers of bed-disability days and restricted-activity days within the past two weeks [66]. For children under two years of age, we obtained the numbers of days that the child had eating problems, sleeping problems, and was unusually irritable within the past two weeks [67]. In addition, developmental milestones were obtained by determining the ages at which the child first sat up, walked, and talked.

Several measures were also used to assess the respondent's general beliefs about child health and health care. A shortened version of a scale developed by Mechanic [24] was employed to quantify her familiarity with common childhood illness. Five items were scored according to the frequency of the respondent's experience with sore throats, stomach aches, diarrhea, vomiting, and ear aches. Another one of Mechanic's scales was used to measure her propensity to seek pediatric care [24,27]. The respondent was asked whether she would take her child to a health care provider if the child had each of five specific symptoms. A four-item measure of the respondent's health-specific locus of control (i.e., internal versus external control) was also taken from Tessler and Mechanic [27], who developed an abbreviated version of the original scale [68]. Other questions were directed at the relative importance attached to preventive care for children (one item) and general attitudes toward medical care providers (seven items) [27]. To measure the respondent's perceptions of her personal experience with pediatric care, we inquired about the availability and accessibility of care for her child (seven items) and her satisfaction with the care received in the past year (ten items) [27].

The final set of attitude measures concerns the respondent's perceptions of her own health status and health behavior. NCHS items were used to indicate the respondent's global assessment of her current health status on a five-category ordinal scale, a history of 30 common conditions, the number of disability days within the past three months, and the numbers of physician visits, hospitalizations, and serious illnesses within the past two years [66]. In addition, we applied part of the Rand Health Perceptions questionnaire to measure six health dimensions: current health, prior health, health outlook, health worry/concern, resistance/susceptibility to illness, and sickness orien-

tation [69]. The instrument consisted of 20 statements to which the respondent reported her level of agreement or disagreement on a five-category scale.

Medical Record Abstraction

Within one day of the mother's baseline interview, data were abstracted from the child's medical record at the Yale Health Plan. Information was collected on the child's birth, early development, medical history, and previous medical utilization.

Birth information included the following variables: place, date, height, weight, gestational age, Apgar scores, and complications. To measure early physical development, we recorded growth chart information on height, weight, head circumference, and their corresponding age-specific percentiles relative to other children. Also abstracted was a history of behavioral, speech, and language problems.

Information was obtained on the history of serious illnesses, significant injuries, allergies, disabilities, and other chronic conditions. To assess prior utilization, we obtained data on all hospitalizations and visits to the Health Plan during the previous year. For each hospitalization, we recorded the dates, length of stay, and discharge diagnosis. For each Health Plan visit, we recorded the date, purpose of the visit, diagnosis, prescription of medication, use of lab tests, and consults.

Using only data abstracted from the medical records, we developed an index of the child's general health status at baseline. The pediatric staff was asked to rate every condition diagnosed in that department according to the likelihood of it resulting in the use of health services during the following year. By consensus each condition was classified into one of four categories, coded 0-3: (0) no implication for use of health services (e.g., mild postural tendency, red papule, or no condition); (1) minor condition (e.g., allergy, mild wheezing, and minor orthopedic problems); (2) moderate condition (e.g., chronic otitis media, pneumonia not requiring hospitalization, and mild hip dysplasia); or (3) major condition (e.g., severe hearing loss, pneumonia requiring hospitalization, and fetal alcohol syndrome).¹ Each child was then assigned to the category of the most serious condition documented in his or her chart.

Follow-up Questionnaire and Interview

Five and one-half months after her baseline interview, each study mother, including those who had disenrolled from the Yale Health Plan, was sent a follow-up questionnaire. Following second mailings and telephone calls for initial nonresponders, 492 women (92 percent of the study population) returned completed questionnaires by June 15, 1982. Updated information was collected on the occurrence of stressful life events, depressive symptomatology (CES-D), and child care arrangements within the past six months.

Exactly 12 months after their baseline interviews, study mothers still living in the northeastern United States were phoned for a final interview, and mothers who had relocated outside this region were mailed a final questionnaire. During the 12-month follow-up period, 118 (22 percent) respondents and their families had disenrolled from the Health Plan and an additional five (1 percent) withdrew from the study after receiving the six-month follow-up questionnaire. Nonetheless, using intensive follow-up mechanisms, we were able to complete final interviews or questionnaires with 515 women (97 percent of the study population). Information was collected on the

¹A complete list of all conditions and their assigned categories is available from the authors.

following: status of the family's Health Plan membership during the past year, reported use of medical services by the study child at each Health Plan department and at other facilities for the past year, and smoking habits of all adults in the household.

Prospective Outcome Data

For the 12-month period following each baseline interview, data were collected on the child's use of medical care services at the Yale Health Plan and on related occurrences of morbidity. This information may be divided into three areas, according to the type of contact: visits to the department of Pediatrics, visits to other Health Plan departments, and phone calls to Pediatrics.

The date and purpose of every visit to the department of Pediatrics by study children were recorded by the research assistant. If the purpose of the visit was acute care, the accompanying adult was asked a set of questions before the child was seen by the provider. The research assistant requested the name of the adult, his or her relationship to the child, the nature of the child's symptoms that motivated the visit, the numbers of previous visits and phone calls for the current illness, whether the current visit was recommended by a provider during a previous contact, specific actions taken by the parents before bringing the child to the Health Plan, and the number of illnesses for which the child was not taken to the health care provider since the last visit. In addition, the accompanying adult was asked to rate the severity of the child's symptoms on a five-category ordinal scale. After seeing the child, the provider filled out an encounter form that included the purpose of the visit, the child's diagnosis, and his independent rating of the child's symptom severity on the same scale used by accompanying adults.

The research assistant periodically reviewed the children's medical records and daily intake logs for information on visits and calls to Health Plan departments other than Pediatrics. For visits scheduled during regular business hours, she abstracted the department, date, and purpose of the visit, the provider's diagnosis, and an indication of whether the contact was a follow-up visit or referral. For unscheduled "urgent" visits at night or on weekends, the research assistant abstracted the names of the child and accompanying adult, the time and date of the visit, the child's presenting symptoms, the provider's diagnosis, and recommendations for follow-up care.

Pediatric nurses obtained information from phone calls made to that department by parents concerned with their children's health. They recorded the date of each call, the name and relationship of the caller, the child's problem and reasons for the call, the dates of any previous calls for the current illness, actions taken prior to the call, their recommendations to the caller, and the duration of the call. Nurses were also asked to rate the severity of the child's symptoms on a five-category scale and to rate the perceived stress level of the caller on a three-category scale.

All morbid events observed during the follow-up period were identified from clinical examinations at the Health Plan. Since some events occurring in the study population, especially less serious illnesses or injuries, are not likely to be seen at the clinic, there is the potential for bias when testing health effects. Three methods will be used to deal with this potential problem arising from the confounding of illness and illness behavior. First, we can control analytically for covariates that reflect the tendency for a child to be taken to a physician, such as total utilization in the year before the follow-up period and factors that are shown to predict utilization during the follow-up period. We can also adjust for the rate of past occurrences of the event under study (i.e., during the

previous year) and for general baseline health status of the child. Second, episodes of care for the event under study can be stratified according to type and severity of presenting symptoms. Thus, we should be able in part to isolate the subset of events that are least likely to escape detection at the clinic. Third, we have asked each adult accompanying a child to the Pediatrics department how often the child had been ill since his or her last visit.

SUMMARY

The study described in this report is a prospective investigation of child morbidity and health care behavior in a fixed cohort of preschool children whose families belonged to a prepaid group practice. Our aim is to understand how certain psychosocial factors associated with the family environment influence childhood illness, injury, and pediatric utilization of services. The dual emphasis on both morbidity and behavior is based on the premise that epidemiologic and health services issues are interrelated to such a degree that the interpretation of findings from each research area requires an understanding of the other area.

Since the families in this study are members of a single prepaid group practice, relatively well educated and mobile, they are certainly not representative of the general population of families with preschool children. Consequently, we cannot expect to generalize our results, especially regarding predictors of behavior, to all preschool children in a given region.

Yet, despite the limitation in generalizability, this study has several methodologic strengths that enhance internal validity and our ability to interpret observed psychosocial effects. Most important among these is the prospective design, especially the method of collecting outcome data directly from accompanying adults and providers at the time of each pediatric contact. Another positive feature is the comprehensive approach to measuring different aspects of the mother's social network and family stressors at the start of the follow-up period. Third, our method of collecting outcome data from several sources allows us to define episodes of care, linking multiple Health Plan contacts with morbid events for each child. Finally, the study population and setting is well suited for testing the stated hypotheses. Our subjects are heavy utilizers of pediatric services; they show considerable variability in key psychosocial factors yet little variability in access to care; and both study parents and providers have been very cooperative in their willingness to participate and to provide information.

In future papers, we will present the results of various analyses for describing the population and for testing specific hypotheses. We hope that our efforts will help to integrate the substantive and methodologic concerns for social epidemiologists and health services researchers interested in the study of children.

REFERENCES

1. Holland WW: The epidemiologist. In *Positions, Movements, and Directions in Health Services Research*. Edited by G McLachlan. London, Oxford University Press, 1974, pp 54-66
2. Henderson M: The engagement of epidemiologists in health services research. *Am J Epidemiol* 103:127-137, 1976
3. Hulka BS: Epidemiological applications to health services research. *J Comm Health* 4:140-149, 1978
4. Ibrahim MA: Epidemiology: application to health services. *J Health Admin Educ* 1:37-69, 1983
5. Tugwell P, Bennett KJ, Sackett DL, Haynes RB: The measurement iterative loop: a framework for the critical appraisal of need, benefits and costs of health interventions. *J Chronic Dis* 38:339-351, 1985

6. Horwitz SM, Morgenstern H, Berkman LF: The use of pediatric medical care: a critical review. *J Chronic Dis* 38:935-945, 1985
7. Morgenstern H, Horwitz SM, Berkman LF: Connections between epidemiology and health services research: a review of psychosocial effects on childhood morbidity and pediatric medical care use. *J Ambul Care Management*, in press
8. Mechanic D: Stress, illness, and illness behavior. *J Hum Stress* 2:2-6, 1976
9. Haggerty RJ: Life stress, illness and social supports. *Develop Med Child Neurol* 22:391-400, 1980
10. Shuval JT: The contribution of psychological and social phenomena to an understanding of the aetiology of disease and illness. *Soc Sci Med* 15A:337-342, 1981
11. Mechanic D: Illness and cure. In *Poverty and Health: A Sociological Analysis*. Edited by J Kosa, A Antonovsky, IK Zola. Cambridge, MA, Harvard University Press, 1969, pp 191-214
12. Eisenberg L: What makes persons "patients" and patients "well?" *Am J Med* 69:277-286, 1980
13. Mechanic D: The epidemiology of illness behavior and its relationship to physical and psychological distress. In *Symptoms, Illness Behavior, and Help Seeking*. Edited by D Mechanic. New York, Prodist, 1982, pp 1-24
14. Rosenstock IM, Kirscht JP: Why people seek health care. In *Health Psychology—A Handbook*. Edited by GC Stone et al. San Francisco, Jossey-Bass Publishers, 1979, pp 161-188
15. McKinlay JB, Dutton DB: Social-psychological factors affecting health service utilization. In *Consumer Incentives for Health Care*. Edited by SJ Mushkin. New York, Prodist, 1974, pp 251-303
16. Becker MH: Psychosocial aspects of health-related behavior. In *Handbook of Medical Sociology*, Third edition. Edited by HE Freeman, S Levine, LG Reeder. Englewood Cliffs, NJ, Prentice-Hall, 1979, pp 253-274
17. Roghmann KJ, Haggerty RJ: Models of health and illness behavior. In *Child, Health and Community*. Edited by RJ Haggerty, KJ Roghmann, IB Pless. New York, Wiley-Interscience, 1975, pp 119-156
18. Brink SG, Nader PR: Patterns of primary care utilization in a triethnic urban population of school children. *Med Care* 19:591-599, 1981
19. Andersen R, Kasper JD: The structural influence of family size on children's use of physician services. *J Comp Fam Studies* 4:116-130, 1973
20. Tessler R: Birth order, family size, and children's use of physician services. *Health Serv Res* 15:55-62, 1980
21. Ross CE, Duff RS: Returning to the doctor: the effect of client characteristics, type of practice, and experiences with care. *J Health Soc Behav* 23:119-131, 1982
22. Carpenter ES: Children's health care and the changing role of women. *Med Care* 18:1208-1218, 1980
23. Cafferata GL, Kasper JD: Family structure and children's use of ambulatory physician services. *Med Care* 23:350-360, 1985
24. Mechanic D: The influence of mothers on their children's health attitudes and behavior. *Pediatrics* 33:444-453, 1964
25. Becker MH, Nathanson CA, Drachman RH, Kirscht JP: Mothers' health beliefs and children's clinic visits: a prospective study. *J Comm Health* 3:125-135, 1977
26. Selwyn BJ: An epidemiological approach to the study of users and non-users of child health services. *Am J Public Health* 68:231-235, 1978
27. Tessler R, Mechanic D: Factors affecting children's use of physician services in a prepaid group practice. *Med Care* 16:33-46, 1978
28. Roghmann KJ, Haggerty RJ: Daily stress, illness, and use of health services in young families. *Pediatric Res* 7:520-526, 1973
29. Gortmaker SL, Eckenrode J, Gore S: Stress and the utilization of health services: a time series and cross-sectional analysis. *J Health Soc Behav* 23:25-38, 1982
30. Starfield B, van den Berg BJ, Steinwachs DM, Katz HP, Horn SD: Variations in utilization of health services by children. *Pediatrics* 63:633-641, 1979
31. Shuval JT: *Social Functions of Medical Practice*. San Francisco, Jossey Bass Publishers, 1970
32. Suchman EA: Health orientation and medical care. *Am J Public Health* 56:97-105, 1966
33. Geertsen R, Klauber MR, Rindflesh M, Kane RL, Gray R: A re-examination of Suchman's views on social factors in health care utilization. *J Health Soc Behav* 16:226-237, 1975
34. Berkanovic E, Telesky C: Social networks, beliefs, and the decision to seek medical care: an analysis of congruent and incongruent patterns. *Med Care* 20:1018-1026, 1982
35. McKinlay JB: Some approaches and problems in the study of the use of services—an overview. *J Health Soc Behav* 13:115-152, 1972

36. Benson P, Gabriel A, Katz H, Steinwachs D, Hankin J, Starfield B: Preventive care and overall use of services: Are they related? *Am J Dis Child* 138:74–78, 1984
37. Meyer RJ, Haggerty RJ: Streptococcal infections in families: factors altering individual susceptibility. *Pediatrics* 29:539–549, 1962
38. Heisel JS, Ream S, Raitz R, Rappaport M, Coddington RD: The significance of life events as contributing factors in the diseases of children: III. A study of pediatric patients. *J Pediatr* 83:119–123, 1973
39. Beautrais AL, Fergusson DM, Shannon FT: Life events and childhood morbidity: a prospective study. *Pediatrics* 70:935–940, 1982
40. Boyce WT, Jensen EW, Cassel JC, Collier AM, Smith AH, Ramey CT: Influences of life events and family routines on childhood respiratory tract illness. *Pediatrics* 60:609–615, 1977
41. Minuchin S, Baker L, Rosman BL, Liebman R, Milman L, Todd TC: A conceptual model of psychosomatic illness in children: family organization and family therapy. *Arch Gen Psychiatry* 32:1031–1038, 1975
42. Beautrais AL, Fergusson DM, Shannon FT: Childhood accidents in a New Zealand birth cohort. *Aust Paediatr J* 18:238–242, 1982
43. Padilla ER, Rohsenow DJ, Bergman AB: Predicting accident frequency in children. *Pediatrics* 58:223–226, 1976
44. Newberger EH, Reed RB, Daniel JH, Hyde JN Jr, Kotelchuck M: Pediatric social illness: toward an etiologic classification. *Pediatrics* 60:178–185, 1977
45. Sibert R: Stress in families of children who have ingested poisons. *Br Med J* 3:87–89, 1975
46. Brown GW, Davidson S: Social class, psychiatric disorder of mother, and accidents to children. *Lancet* i:378–380, 1978
47. Wadsworth J, Burnell I, Taylor B, Butler N: Family type and accidents in preschool children. *J Epidemiol Comm Health* 37:100–104, 1983
48. McCormick MC, Shapiro S, Starfield BH: Injury and its correlates among 1-year-old children. *Am J Dis Child* 135:159–163, 1981
49. Taylor B, Wadsworth J, Butler NR: Teenage mothering, admission to hospital, and accidents during the first 5 years. *Arch Dis Child* 58:6–11, 1983
50. Colley JRT: Respiratory symptoms in children and parental smoking and phlegm production. *Br Med J* 2:201–204, 1974
51. Gortmaker SL, Walker DK, Jacobs FH, Ruch-Ross H: Parental smoking and the risk of childhood asthma. *Am J Public Health* 72:574–579, 1982
52. Tager IB, Weiss ST, Rosner B, Speizer FE: Effect of parental cigarette smoking on the pulmonary function of children. *Am J Epidemiol* 110:15–26, 1979
53. Bonham GS, Wilson RW: Children's health in families with cigarette smokers. *Am J Public Health* 71:290–293, 1981
54. Vogt TM: Effects of parental smoking on medical care utilization by children. *Am J Public Health* 74:30–34, 1984
55. Holmes TH, Rahe RH: The social readjustment rating scale. *J Psychosom Res* 11:213–218, 1967
56. Rahe RH: Epidemiological studies of life change and illness. *Int J Psychiatr Med* 6:133–146, 1975
57. Tausig M: Measuring life events. *J Health Soc Behav* 23:52–64, 1982
58. Ilfeld FW Jr: Characteristics of current social stressors. *Psychol Rep* 39:1231–1247, 1976
59. Pearlin LI, Schooler C: The structure of coping. *J Health Soc Behav* 19:2–21, 1978
60. Radloff LS: The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Measurement* 1:385–401, 1977
61. Weissman MM, Sholomskas D, Pottenger M, Prusoff BA, Locke BZ: Assessing depressive symptoms in five psychiatric populations: a validation study. *Am J Epidemiol* 106:203–214, 1977
62. Myers JK, Weissman MM: Use of a self-report symptom scale to detect depression in a community sample. *Am J Psychiatry* 137:1081–1084, 1980
63. Mitchell JC (ed): *Social Networks in Urban Situations*. Manchester, England, Manchester University Press, 1969
64. Fischer CS: *To Dwell Among Friends: Personal Networks in Town and City*. Chicago, University of Chicago Press, 1982
65. Eisen M, Ware JE Jr, Donald CA, Brook RH: Measuring components of children's health status. *Med Care* 17:902–921, 1979
66. National Center for Health Statistics, U.S. National Health Survey: *The Statistical Design of the*

- Health Household-Interview Survey, U.S. Department of Health, Education, and Welfare, PHS No. 584-A2. Washington, DC, U.S. Government Printing Office, 1958
67. Schach E, Starfield B: Acute disability in childhood: examination of agreement between various measures. *Med Care* 11:297-309, 1973
 68. Wallston BS, Wallston KA, Kaplan GD, Maides SA: Development and validation of the health locus of control (HLC) scale. *J Consult Clin Psychology* 44:580-585, 1976
 69. Ware JE Jr, Davies-Avery A, Donald CA: Conceptualization and Measurement of Health for Adults in the Health Insurance Study: Vol V, General Health Perceptions, No. R-1987/5-HEW. Santa Monica, CA, Rand Corporation, 1978