illness behavic ...r psychological factors indepe ...le, anxious subjects from dys ... without having coronary hear ...em in the measurement of compliance. Haynes et al. (79) have recommended using health outcomes in addition to compliance measures. In a trial of psychosocial interventions to increase compliance in hypertensives, Morisky et al. (139) measured not only an increase in compliance, but a decrease in blood pressure and mortality. A number of family studies use highly subjective and nonstandardized assessments of disease activity. Steidl et al. (196) used the subjective assessments of the dialysis team to measure compliance with medical treatment and overall functioning. Such assessments are likely to be affected by the raters knowledge of the family situation. Even outcome measures such as number of hospitalizations may be influenced in such a manner. For example, Beautrais et al. (14) reported that children from families with many recent stressful events were six times more likely to be hospitalized than children from low stress families. However, the attending physicians may have been aware of the high stress the families were experiencing, and decided to hospitalize the child because he/she felt that the family could not cope with a sick child at home. Studies in mental health have primarily used standardized psychiatric questionaires.

Overall there has been insufficient attention paid to methodology in research on the family's impact on health. Too many authors have inferred causal relationships from correlations found in cross-sectional studies. Nonstandardized family assessment techniques or self-reports of illness are used too frequently. The strength of the evidence which shows that the family has an impact on health is dependent on the quality of the methods used to study this relationship.

FAMILY'S IMPACT ON PHYSICAL HEALTH

OVERALL MORTALITY: BEREAVEMENT AND SOCIAL SUPPORTS

All research on the family's impact on overall mortality uses the social epidemiology paradigm. In this model, stress is viewed as detrimental and lowers the host's resistance while social supports are considered beneficial and either buffer the effects of stress or directly raise the host's resistance. While these studies have not always been considered family research, they offer convincing evidence that family factors affect physical health.

There is a large body of literature on the health consequences of bereavement, including several reviews (95, 205) and a recent report by the National Academy of Sciences (102). The two major types of studies of bereavement have obtained different results. Cross-sectional or prevalence studies, many

of which have used census data, have demonstrated dramatically increased death rates for all causes among the widowed. The most famous study of this type was done by Kraus and Lillienfeld (109), who found that for young widowers, the death rates for certain diseases was increased by a factor of 10. There are two major problems with cross-sectional studies of this kind. First, within any age group the widowed tend to be older than the married and have a higher death rate due to age alone. Second, widows or widowers who have remarried are counted as married, and since they are likely to be healthier than those who remain widowed, those who have not remarried will have a higher death rate due to selection alone.

Prospective cohort studies avoid these problems and have generally found much less adverse effect of bereavement, with an approximate 50% increase in mortality limited to men. Parkes et al. (159) followed approximately 5,000 widowers for 9 years and compared their mortality rate to the general population matched for age and social class. There was a 40% increase in mortality due primarily to heart disease but only in the first 6 months. A major problem with this and similar cohort studies is choosing an appropriate comparison group. If the bereaved group differs from the comparison group in some factor which affects mortality (e.g., occupational status, health practices), that factor may confound the results.

In what may be the best controlled study on bereavement at the present time, Helsing et al. (84) studied a large widowed cohort and a control group matched for age, sex and residence for 10 years. They found an increase in mortality for both widowed men and women, but when other potential confounding variables (especially smoking and SES) were controlled for, the results were significant only for widowers. The increased mortality was not restricted to the bereavement period, but persisted throughout the 10 years. They also found that the widowers who remarried had a subsequent mortality rate which was lower than the control group. This could have resulted either from a selection of the healthier to remarry or a protective effect of marriage.

There are three different hypotheses to explain an increase in death rates after the death of a spouse. The first is the concept of homogamy, that the "unfit marry the unfit." Part of marital selection may involve consciously or unconsciously choosing a partner who shares certain traits. If these traits affect health or longevity (e.g., physical disabilities, obesity, smoking, physical activity) the couple may have a tendency to die prematurely or at a similar age. In the Framingham Study (182), most of the coronary risk factors, including blood pressure, cholesterol, weight and cigarette smoking, had a higher concordance between spouses than expected by chance. The spouses' concordance did not change over the 12-year observation period, suggesting that the similarities were due to marital selection, not shared environment. Marital therapists have described couples as usually sharing the same degree of emotional health or stability.

A second and related hypothesis is that the couple may share an unfavorable physical environment. Environmental pathogens play a major role in many diseases and may be shared within the family. This is obvious in infectious diseases such as tuberculosis, but may play a particularly important role in cancer. The family may live near a toxic waste dump (e.g., Love Canal) or one member of the family may bring a carcinogen such as asbestos home with him or her from the workplace. A family tends to eat the same diet, which plays a major role in heart disease and perhaps hypertension. Some aspects of the shared environment can be controlled for (smoking, place of residence, occupation). An argument has been made that if either homogamy or joint unfavorable environment accounted for the increased death rates of the widowed, the couple should both die of the same cause. Parkes et al. (159) did find a slight increase in the expected concordance in causes of death in his cohort. This argument supposes that there is a direct one-to-one relationship between a pathogenic factor and a disease, when it is known that such relationships are more complex. For example, smoking causes many different illnesses.

The third hypothesis to explain the increase in mortality after the death of a spouse is that the loss of the spouse directly leads to the increase in death rate. The stress and grief of bereavement appears to cause changes in neuroendocrine and psychoimmunological functioning which may lower resistance to illnesses (11, 184). Studies such as Parkes's (159), which show an increased mortality limited to the bereavement period, support this view of the noxious nature of bereavement. Helsing's (83) finding of persistant effects of the loss of spouse suggest that it may be the loss of social support, emotional or physical, which is harmful. While the acute versus chronic nature of the health effects are uncertain, the distinctions between loss of social supports and stress are largely semantic and relate to the difficulties of defining stress.

In summary, there is substantial evidence to show an increase in mortality in men after the death of their spouses. Whether this effect is acute or chronic and whether it is due to shared traits with the spouse or the loss of the spouse is not clear.

While research on stress is declining, both in numbers of papers and influence, social network/support research is growing and has become a major field in itself. The advantages of this research are precisely the areas where studies on stress are weakest. The concept of social networks and social supports can be clearly defined and measured. They can be examined in a prospective manner whereby the presence of social supports at one point in time can be correlated with subsequent changes in health, while controlling for confounding variables.

Social supports are defined by Berkman (16) as "the emotional, instrumental and financial aid that is obtained from one's social network." She further defines social networks as "the web of social ties that surrounds an

individual." Social networks may or may not be supportive. Social supports involve a subjective appraisal by the individual of his social network. In most of the research in this area to date, the social variables are very crudely measured and include both social networks (objective measure of social ties) and social supports (subjective perception of the aid received from networks).

There are four major studies that show a relationship between social networks or supports and overall mortality, and one study that showed no relationship. All five studies are very similar in design and differ only in the population studied, measures of social networks/supports and strength of associations. Each is a retrospective cohort study. The major limitation of this approach is that one only has that information which was collected at the beginning of the study. Thus measures of social networks/supports must be adapted from the data collected, and cannot be designed de novo. This accounts for many of the different measures of social networks/supports in these studies.

It is generally accepted that there is a relationship between social supports and health; that is, persons of poor health have fewer social contacts and social supports than those in good health. One likely explanation for this relationship is that physical illness limits one's social interaction and leads to both physical and emotional isolation. The task of this research is to demonstrate that social networks and supports also affect health. These studies offer a model for sorting out the interaction between family and health, using prospective studies in which the severity of illness is initially measured and controlled for, and the impact of a family variable, such as family functioning, on the illness is measured over time.

The seminal study in this field was conducted by Berkman and Syme (17) in Alameda County using the Human Population Laboratory. Each measure of social networks was significantly associated with subsequent mortality in both men and women. Marital status and contacts with relatives and friends were the most powerful predictors. A Social Network Index was derived from all four measures of social ties (marriage, contacts with relatives and friends, church membership, and group associations). The most socially isolated on this scale had an increased, relative risk of dying of 2.3 for men and 2.8 for women, compared to the least isolated group.

This study was essentially repeated by House et al. (90) using data collected for the Tecumseh Community Health Study, and similar but not as impressive results were obtained. In contrast to the Alameda County study, the association between social networks and mortality occurred only in men. Attending church was the only social variable associated with lower mortality. The relationship between a derived Index of Social Relationships and Activities and mortality was not linear. There was a threshold of social relationships above which there was no further protection. There was no relationship between perceived satisfaction with social networks and mortality in this study.

The one majo
social supports
olulu Heart Proj
living in Hawai
examined chron
and sociocultura
between any psy
even when high
Berkman (16) h
in a socially coh
socially isolated
social supports a

Two studies e
tality in the eld
County Aging St
perception of so
social supports
during the 30-m
ports and morta
impact of religi
group of elderly
subsequent survi
duced mortality
was marital statu
general populatio
while in the elder
the adverse effec
who survive the
small to detect.

Broadhead et a
between social s
logic gradient, b
and specificity
evidence for all
the effects of soc

The results of
social ties and s
that the family i
used slightly diff
effects are due t
nature and quali
social supports a
flicting evidence
health is linear o

The one major study in this field that failed to show a relationship between social supports and mortality was derived from data collected for the Honolulu Heart Project (170). The study was limited to men of Japanese ancestry living in Hawaii. In addition to measuring social supports, the researchers examined chronic stressors, including geographic and generational mobility and sociocultural and spousal inconsistancies. They found no association between any psychosocial measure and mortality at the 7-year follow-up, even when high stress and low social supports were examined together. Berkman (16) has suggested that social supports may not be as important in a socially cohesive and well-integrated population, where even the most socially isolated may enjoy considerable social support. Further studies on social supports and health in other populations and cultures are needed.

Two studies examining the relationship between social supports and mortality in the elderly produced very similar results. As part of the Durham County Aging Study, Blazer (22) found that the availability, frequency and perception of social supports were each associated with mortality. Impaired social supports was the strongest predictor with a relative risk of dying during the 30-month follow-up of 3.4. The relationship between social supports and mortality was not linear. Zuckerman et al. (230) examined the impact of religiousness, happiness, and social supports on mortality in a group of elderly poor. The presence of living children was associated with subsequent survival. Happiness and religiousness was associated with reduced mortality only in the elderly in poor health. In neither of these studies was marital status associated with mortality. It appears that for the younger general population, the spouse is the most important source of social support, while in the elderly, children become more important. Perhaps this is because the adverse effect of the loss of the spouse is time limited, and for those who survive the bereavement period, any effect of widowhood becomes too small to detect.

Broadhead et al. (26) reviewed each of eight criteria for inferring causality between social supports and health (temporality, strength, consistency, biologic gradient, biologic plausibility, coherence, experimental/intervention, and specificity of outcome). They concluded that there is epidemiologic evidence for all of these criteria, except for specificity. Studies suggest that the effects of social support are not specific for any illness.

The results of these studies provide strong and persuasive evidence that social ties and supports have a major influence on overall mortality, and that the family is the most important element of that support. Each study used slightly different measures of social supports. How much these health effects are due to the presence of social connections (networks) or to the nature and quality of those ties (i.e., social supports) is not known. How social supports affect men versus women needs further study. There is conflicting evidence as to whether the relationship between social supports and health is linear or whether a threshold of support exists above which there

is no further protection. Finally, it appears that these results do not apply to all populations.

The advantage of the social networks/supports research is the powerful research design: prospective studies with large numbers of subjects, objective measures of outcome, and control of confounding variables with multivariate analyses. The major disadvantage of these studies is the crude measure of family variables. The presence or absence of family members (e.g., marital status, number of living children) and visits with relatives (and friends) are the most important family variables, but they tell us little about the quality or nature of the family interactions. Similar studies need to be done in which family functioning and marital relationships are assessed as independent variables.

CARDIOVASCULAR DISEASE AND HYPERTENSION

For no other physical illness has there been as much attention paid to psychosocial factors as for coronary heart disease (CHD). Because of its high prevalence, particularly in middle aged men in economically productive jobs, there has been strong interest and a large amount of research on the role of stress in heart disease. Unfortunately, there has been little research on the role of the family. For example, much of our knowledge about the natural history of heart disease comes from the Framingham study. It focused primarily on individual or intrapsychic variables, such as anger, depression, and Type A personality, and has examined very few family or interpersonal variables. In a Framingham study of psychosocial factors in CHD (81), a 300-question psychosocial interview with 20 separate scales was administered to 1,600 subjects. Only two questions involving the family (marital dissatisfaction and disagreement) were included, and neither was associated with subsequent development of CHD. In a separate report from the Framingham study (61, 80), the relationship between the incidence of CHD in men and the social status (occupation and education) and behavior type (A or B) of their wives was examined. Men had a higher risk of developing CHD if they were married to women who had more than a high school education and worked outside of the home or had a white collar job. This risk increased if the wife had an unsupportive boss and fewer job promotions. This report suggests that a woman's occupational stress affects the risk of developing heart disease in her husband. Perhaps there is a sharing of stress, such that the supportive husband can help reduce the stress in his spouse, but raise his own risk of illness in the process.

There is strong evidence that marital status affects cardiac mortality. Koskevou et al. (106) examined all cardiac death in Finland. After controlling for social class and age, unmarried persons had a 3.3 times higher death rate from cardiovascular disease than married persons. The best known research on heart disease and the family was done by Medalie and colleagues

(126, 127, 128) in the early seventies. The Israel Ischemic Heart Disease Project was a prospective cohort study similar to the Framingham Study. It followed 10,000 male civil servants over the age of 40 and without evidence of CHD for 5 years to see what clinical and psychosocial variables were associated with the development of CHD (angina and myocardial infarction). No family variables were associated with myocardial infarction (127). The presence of family problems was strongly associated with the development of angina (128), and in a multivariate analysis, was as powerful a predictor or risk factor as systolic blood pressure, serum cholesterol or an abnormal EKG (126). In men with high anxiety scores, "wife's love and support" protected against the development of angina.

The finding by Medalie that family problems and spousal support are related to the development of angina but not myocardial infarction could have three interpretations. 1) Since myocardial infarction is much less common than angina, one is more likely to miss a relationship which exists (Type II error). Men who reported that their "wives did not love them or show their love" may have had a higher incidence of MIs which did not reach statistical significance. 2) Angina and myocardial infarction may have different risk factors and there is some evidence to support this. 3) Angina is a symptom and therefore an illness behavior, and may not correlate well with underlying CHD. Anxious men without spousal support or with family problems may report more chest pain without having more CHD.

In the Honolulu Heart Program (171), the relationships between social supports and both the prevalence and incidence of CHD were examined. Unlike the previous two studies, men with CHD were not excluded from entering the study. A social network scale was derived from questions regarding relationships with parents, spouse and children, and social and religious activities. Scores on the social network scale were related to the initial prevalence of CHD but not to the subsequent development (incidence) of CHD. The most plausible explanation for this discrepancy between prevalence and incidence is that CHD results in poor social supports and not vice versa.

The studies on the impact of the family on the course of CHD are more persuasive than studies of CHD incidence. Two studies have examined the effect of family factors on mortality after myocardial infarction. Chandra et al. (41) followed 1,400 patients for 10 years after their myocardial infarctions and found that those who were married at the time of their MI had a greatly decreased risk of dying both during their hospitalization and over the next 10 years. The difference was greatest for women. No distinction was made between never married, widowed, and divorced.

Ruberman and colleagues (179) studied the relationships between several psychosocial factors and mortality after an MI in an ancillary study of the Beta blockers after Heart Attack Trial (BHAT). Their psychosocial questionnaire was designed to measure life stress (including questions about

divorce or breakup of the family, and violence involving the patient or family), social isolation (including a question on visiting friends and relatives), Type A personality and depression. When confounding variables were controlled for, the authors found that both social isolation and high stress were strongly associated with mortality over the subsequent 2-4 years, and together they were better predictors of mortality than any of the measured physiologic risk factors (which included myocardial function or premature ventricular beats). Unfortunately the reliability and validity of the questionnaire used is unclear and it is only marginally related to family. From this study one can conclude that psychosocial factors affect survival after myocardial infarction, but that the nature of those factors and whether they involve the family is not known.

The only intervention study in cardiovascular disease which involves the family was done with urban poor patients with hypertension at Johns Hopkins (113, 139). The study compared three educational interventions (brief individual counseling, instructing the spouse or significant other during a home visit, and small patient group sessions) in improving appointment keeping, weight control, and medication compliance. Educating the spouse not only improved overall compliance, but resulted in significant reduction in blood pressure and in overall mortality. However, all the experimental groups had a significant improvement in each of the outcome measures with an overall 57% decrease in mortality compared to the control group. The groups involving education of the spouse tended to do better than the other intervention groups but the differences were not statistically significant. The family intervention in this study was included after a survey of the clinic's hypertensive patients indicated that 70% expressed the desire for family members to know more about hypertension. This study clearly shows the effectiveness of involving the spouse in the care of hypertensive patients. The family intervention has become incorporated into the routine care of hypertensive patients at Johns Hopkins. This study was unable to determine whether the family intervention was significantly better than the simpler 10-minute individual counseling session, or whether adding the family intervention to the individual session made a difference.

One potential area for family intervention is cardiovascular risk factor reduction. Hoebel (85) described a series of patients with cardiac disease who would not change their high-risk behavior (smoking, high cholesterol diet, lack of exercise and Type A behavior). He worked individually with the wives of these patients to show them how they were reinforcing their husbands' behaviors and how they could change that. In seven of nine cases, the intervention with the wife changed the husband's behavior. Since most of these behaviors are likely to be affected by the family, it seems probable that simpler family interventions, such as education, may be effective and can be adequately evaluated. Baranowski et al. (10) conducted a randomized trial of multifamily groups to determine whether they could get families to

be more supportive t
in the multifamily g
in diet and exercise

Two cross-sectio
family support and
Doherty et al. (58)
pliance with a chol
ciated with compli
"reminding him ab
correlated with he
suggests that the H
individual beliefs.
significant cardiac
men who reported
complete the progr
ative.

In summary, th
spousal support, a
infarction. The me
to be due to increa
is only weak evid
heart disease.

Type I or inst
begins in childho
appears to prevei
pathy, nephropat
tensive daily adju
recommend hom
sugar and two t
a major impact
tioning of the fa
lescent may affe
one would antici
of diabetes and t
child and the fa

Most of wha
descriptive or t
for diabetics ar
search, they ca
White et al. (22
diabetes who h

be more supportive toward changes in the families' diet and exercise. Families in the multifamily group did report more supportive behavior, but changes in diet and exercise were not measured.

Two cross-sectional studies have demonstrated a relationship between family support and compliance with cardiovascular risk reduction programs. Doherty et al. (58) found a correlation between spousal support and compliance with a cholesterol-lowering agent. Specific spouse behaviors associated with compliance included "showing interest in the program" and "reminding him about his medicine and diet." The spouse's support also correlated with her belief in the benefits of the medication. This finding suggests that the Health Belief Model should incorporate family as well as individual beliefs. In a less well-designed study (82), middle-age men with significant cardiac risk factors were enrolled in an exercise program. Those men who reported a positive attitude by their wives were more likely to complete the program than those whose wife's attitude was neutral or negative.

In summary, there is strong evidence that family factors, particularly spousal support, affect mortality due to hypertension and after myocardial infarction. The mechanism in CHD is unclear, but in hypertension it appears to be due to increased compliance with medication and weight control. There is only weak evidence to show that the family affects the development of heart disease.

DIABETES

Type 1 or insulin-dependent diabetes is a chronic disease which often begins in childhood or adolescence. Tight metabolic control of blood sugar appears to prevent or delay some of the complications of diabetes (retinopathy, nephropathy and neuropathy). However, tight control requires intensive daily adjustments of diet, exercise and insulin. Most diabetologists recommend home glucose monitoring with up to six measurements of blood sugar and two to three injections of insulin each day. Such a regimen has a major impact on the patient's life and the family environment. The functioning of the family and the psychosocial adjustment of the child or adolescent may affect the ability to adhere to the diabetic regimen. Therefore one would anticipate that there is a complex interaction between the control of diabetes and the psychological health and functioning of both the diabetic child and the family.

Most of what has been written about the family and diabetes has been descriptive or theoretical, based on clinicians' personal experiences caring for diabetics and their families. While these reports help direct future research, they can introduce significant bias into the literature. For example, White et al. (220) reviewed the charts of 30 children with poorly controlled diabetes who had undergone a psychosocial evaluation. Most of the families

were found to have numerous "dysfunctional" psychosocial factors including absent fathers, poor living conditions, inadequate parental functioning, chronic family conflict, and lack of involvement with the diabetes. The conclusions of this study were that poor family functioning caused poor diabetic control. The study suffers from selection biases, reporting biases and lack of comparison groups, and cannot be used to support these conclusions.

Adequate cross-sectional studies of families of diabetics with comparison groups are necessary to determine if there are any family characteristics associated either with diabetes or with poor diabetic control. While there are no studies that compare families of diabetics with controls, there are several studies that compare families whose children have different degrees of diabetic control. Anderson et al. (2) divided 58 adolescent diabetics into good, fair or poor control based upon glycosylated hemoglobin levels, an excellent measure of chronic blood sugar levels. They assessed the families with Moos's Family Environment Scale (FES), completed by both the diabetic child and a parent. Poor control was associated with more conflict and less cohesion among family members, and parents of adolescents with good control encouraged family members to be more independent. In a similar study by Shouval et al. (188) also using the FES, adequate diabetic control was positively associated with clear order and organization within the family and support by the father, and negatively assocated with moralizing by family members. Grey and colleagues (77) studied 20 preadolescent diabetics and their families using Pless and Satterwhite's Family Functioning Index. They found that overall family functioning was associated with diabetic control as measured by 24-hour urinary glucose excretion. The different components of the scale (communication, cohesion, marital satisfaction, etc.) were not specifically examined. They also found that family functioning was closely correlated with parental self-esteem.

These as well as other less well-designed studies provide good evidence that poor diabetic control is associated with family dysfunction, chronic conflict, and low cohesiveness. In most of these studies, poor diabetic control is also associated with poor psychosocial adjustment of the diabetic child or adolescent. While it is likely that an interaction takes place whereby poor diabetic control affects family functioning which in turn affects diabetic control, this remains unproven. Prospective studies in which the degree of diabetic control is controlled for, are necessary to determine the nature of this relationship.

Koski and Kumento (107) have done the only cohort study of diabetics and their families. They followed 60 diabetic children and their families for 5 years. At the beginning of the study (cross-sectional), they did find a relationship between family functioning and diabetic control. However, they did not examine whether family functioning was related to changes in diabetic control over the subsequent 5 years. They did associate changes in

diabetic control (10 i
or changes in the fam

Studies by Minuch
Child Guidance Clini
with diabetics. They
interventions with di
observation that bet
in whom emotional
study (7) showed tha
sugar and free fatty a
girls, similar free fat
using a stressful inte
stressful situation a
beta blocker. These
had improvement in

Work on beta bl
minority of diabetic
in Minuchin's *Psycl*
of three different g
interview were com
emotional arousal
had a rise in free f
began while observ
and persisted beyo
had an initial rise
entered the room.
"normal" diabetic
gested that these
parents' problems
and free fatty ac
ketoacidosis (DK
were able to redu

Unfortunately,
published. The n
somatic diabetics
suggesting both
can affect diabe
these families. M
is primarily thro

From these st
diabetes, asthm
developed the
a psychosomati
and be involve

diabetic control (10 improved, and 10 worsened) with stressful life events or changes in the family, but this was done in an anecdotal fashion.

Studies by Minuchin and his associates (133, 134) at the Philadelphia Child Guidance Clinic have had major influences on the approach to families with diabetics. They have conducted both experimental studies and clinical interventions with diabetics and their families. Their work began with the observation that beta blockers could improve diabetic control in children in whom emotional arousal appeared to play an important role. An early study (7) showed that a beta blocker could prevent the normal rise of blood sugar and free fatty acids in response to infused epinephrine. In two diabetic girls, similar free fatty acid and blood sugar changes could be reproduced using a stressful interview designed to "reproduce what was viewed as the stressful situation at home." These responses were also blocked with the beta blocker. These two girls received the drug chronically for a year and had improvement in their diabetic control.

Work on beta blockers was abandoned when it was discovered that a minority of diabetics responded to it. In their most famous study reported in Minuchin's *Psychosomatic Families* (8, 9, 134), the physiologic responses of three different groups of diabetics to participation in a stressful family interview were compared. The psychosomatic diabetics were those in whom emotional arousal appeared to adversely affect their diabetic control. They had a rise in free fatty acid (FFA) levels during the family interview, which began while observing the rest of the family from behind a one-way mirror and persisted beyond the end of the interview. The parents of these children had an initial rise in free fatty acids which fell to normal when the child entered the room. None of these changes occurred in either the group of "normal" diabetic or diabetics with behavioral problems. The authors suggested that these children have become overinvolved or enmeshed in their parents' problems and respond to the stress with a rise in catecholamines and free fatty acids which they cannot "turn off," resulting in diabetic ketoacidosis (DKA). By involving the child in family conflicts the parents were able to reduce their own anxiety and their own FFA levels decreased.

Unfortunately, the detailed results of this influential study have never been published. The number of subjects studied was very small (seven psychosomatic diabetics) and there was no statistical analysis. Its importance is in suggesting both a direct physiologic mechanism whereby family interaction can affect diabetic control and an intervention strategy for working with these families. Most previous work has suggested that the effect of the family is primarily through compliance with the diabetic regimen.

From these studies and their clinical work with families of children with diabetes, asthma and anorexia nervosa, Minuchin and his colleagues (134) developed the concept of psychosomatic families. They theorized that for a psychosomatic illness to occur the child must be physiologically vulnerable and be involved in parental conflict. In addition, the family must be en-

meshed, overprotective, rigid and conflict avoiding. They reported successful treatment of 15 labile psychosomatic diabetics using structural family therapy. Treatments lasted 4-12 months. The chronic ketonuria and recurrent hospitalizations for DKA ceased and insulin dosages were reduced.

It is important to separate the Minuchin's conceptual model from his treatment results. Case reports without adequate controls must be viewed with skepticism. In addition, the results may not be related to the conceptual model but due to spontaneous improvement, family education, nonspecific effect of therapy or the skill and enthusiasm of the therapist. One cross-sectional study of 33 diabetics (40) supports some aspects of the concept of psychosomatic families. Family functioning in this study was assessed with the Family Adaptability and Cohesion Scale (FACES). Poor metabolic control was associated with high anxiety in the diabetic and high cohesion (enmeshment) in the father. Tight metabolic control was correlated with low anxiety in the child and high adaptability (low rigidity) in the mother.

Although Minuchin has contributed significantly to the field of "family somatics," most of his work must be considered preliminary and theoretical. The experimental work needs to be repeated with larger numbers of subjects and more rigorous analysis. Empirical confirmation of the concepts of psychosomatic families is necessary. FACES is a particularly useful assessment tool for this endeavor. Finally, controlled trials of family intervention (family education and family therapy) are needed and should be compared with individual interventions (education or therapy).

In summary, several well-designed studies have shown that there is a correlation between family functioning and diabetic control. Poor control is associated with disordered families with a high degree of conflict. There is some evidence to suggest that these diabetic families are more rigid, but the evidence for enmeshment or high cohesion is contradictory. There are no adequate cohort studies on diabetes and the family, and therefore no evidence to show a causal relationship between any family attribute and diabetic control. Minuchin's experimental studies suggest that family stress could have a direct physiologic effect on a child's diabetes. There are no controlled family intervention studies on diabetes at the present time.

ASTHMA

Asthma was one of seven diseases which were thought to be "psychosomatic," that is somatic expressions of internal conflicts and unexpressed emotions. Thus, much of the early literature on the psychosocial aspects of asthma was psychodynamically oriented. There is very little research on the impact of the family on asthma.

Dubo et al. (60) examined the relationships between the quality of family life, the personal adjustment of the child, and the severity of asthma in the child. While there was a strong relationship between the adjustment of the

child and the quality of family life, there was no correlation between either of those factors and the severity of asthma. In an unusual quasi-experimental trial, Purcell and colleagues (165) studied the effect of the removal of the family on the course of asthma of one of the children. They assessed which of the 25 children studied appeared to have emotionally induced asthma, and predicted that only those 13 children would improve with the intervention. The families of all 25 children were removed from the home for 2 weeks, and while each child was cared for by a surrogate parent there was a significant decrease in the severity of asthma in seven (54%) of the children predicted to improve and two (17%) of the other children. Overall, less than half of the children improved with removal of the family, but without a control group it is not possible to determine whether the improvement was due to the intervention. The study illustrates the oversimplistic notion that the family is bad for the child's asthma, rather than considering the interactions between the family and the asthmatic child.

A major influence on the course of asthma is the appropriate response to acute asthmatic attacks. A prolonged attack is more difficult to treat and may be more likely to require hospitalization. Early self-management of acute attacks may reduce the severity and overall impact of the illness. In children, early treatment must be done by the family, and the quality of the family management may affect the impact on the child, the family and the health care system. Clark et al. (43) attempted to improve the family management of asthma in a controlled trial of family education. A randomly assigned group of poor families with an asthmatic child received a series of educational programs on preventing and managing asthma attacks, giving medications and communicating with physicians. In follow-up, the educated families reported taking more self-management steps and having less fear during an acute attack. There was a nonsignificant reduction in school absences and emergency room visits in the experimental group.

Minuchin and his group at the Philadelphia Child Guidance Clinic have been influential in the development of a theory for understanding the role of the family in asthma. His concept of psychosomatic families is described in detail under the Diabetes section of this monograph. Unfortunately there are only case reports and no empirical studies to support this concept in asthmatics. His group did report a series of seven cases of severe asthma which responded dramatically to 5-10 months of weekly structural family therapy (116).

The only controlled trial of family psychotherapy for a physical illness was done in the treatment of moderate-to-severe asthma (110). Thirty-three families with 37 asthmatic children were randomly assigned to experimental or control groups. The experimental group received a total of six hourly family therapy sessions designed to improve the coping skills of the family in dealing with acute attacks. At the end of one year the children in the experimental group reported less daily wheezing and had a slight decrease

in thoracic gas volumes, a measure of lung overinflation which occurs with chronic asthma. There were no differences in the other measures of pulmonary function. While it is clear that the family therapy improved asthma control, it needs to be compared with individual therapy and simple family education to determine what the essential components of the intervention were.

The studies on the family's impact on asthma are too few to allow for any general conclusions to be made. However Lask and Matthew's study suggests that family therapy is effective in the treatment of asthma. It should serve as a model for future studies on the role of family therapy in physical illness.

OTHER PHYSICAL ILLNESSES

Despite the recent interest in psychosocial influences on the development of cancer, there is only one well-designed study that examines any aspect of the family. Horne and Picard (88) examined psychosocial factors in men undergoing workup for suspicious lung masses. They controlled for numerous confounding variables, and found their composite psychosocial scale was 80% specific and 61% sensitive in predicting subsequent cancer. The two family variables, childhood happiness and marital stability were not predictive.

One recent case control study of social factors in ulcer disease examined several family factors. Nasiry and Piper (141) found that unmarried women had a relative risk of 4.37 of having duodenal ulcers, but that family stability and "childhood happiness" were not risk factors. In a study of the family environments of duodenal ulcer patients (222), there was a correlation between three subscales of the Family Environment Scale (independence, achievement orientation, and expressiveness) and serum gastrin levels, but not severity of ulcer symptoms. The significance of this result is unclear.

Several studies have examined the impact of family stress on childhood morbidity, particularly infections. One of the best known studies was done by Meyer and Haggerty (131) before much of the research on stress appeared. They followed a group of lower-middle-class families in Boston for a year and examined what factors were associated with the development of streptococcal pharyngitis. Each family kept diaries of any illnesses and significant life events and were interviewed periodically. Throat cultures were done on each family member every 3 weeks and anti-streptolysin-O (ASLO) titers obtained every 4 months. In addition, the level of chronic family stress was assessed at the beginning of the study. They found that 35% of all the strep infections were preceded by a stressful event in the family and that families with a high degree of family stress had more strep throats and were more likely to develop a rise in ASLO titer, which is related to the risk of developing rheumatic fever. Unfortunately in this study, it cannot be determined when

the families recorde
decided what was to
and raters were blin

Boyce et al.(25) hy
effects of stressful f
ratory infections in
trolled for, the child
not the number of r
family routines conti
of high stress.

The largest and
childhood morbidity
They followed over
recalled significant
influenced by illnes
missions and physi
socioeconomic statu
strongly associated
number of life even
the families with th

Based primarily
reasonably good ev
an adverse effect up
appears to be non
illnesses. In Beautr
and supervision w
morbidity in the cl

Pregnancy is a
of family. It is easi
condition (dichot
reliably measured
time. Obstetrical
known and meas
and social suppo
stress and affect t

Two studies h
ports on the outc
chosocial assets,
(including family
women who had
This finding wa

the families recorded their stressful events (before or after the illness), who decided what was to be scored as a stressful event, and whether the subjects and raters were blind to the hypothesis of the study.

Boyce et al.(25) hypothesized that family routines might buffer the adverse effects of stressful family events. They examined the incidence of all respiratory infections in a day care population over 1 year. When age was controlled for, the children's life events score correlated with the duration, but not the number of respiratory illnesses. Contrary to the study's hypothesis, family routines contributed to the severity of illness, especially in the presence of high stress.

The largest and best designed study on family life events and overall childhood morbidity was conducted in New Zealand by Beautrais et al. (14). They followed over 1,000 children from age 1 to 4. For each year mothers recalled significant family life events which were not likely to have been influenced by illness in the child. Morbidity was measured by hospital admissions and physician visits. When race, family size, maternal age, and socioeconomic status were controlled for, both measures of morbidity were strongly associated with life events. Children from families with the highest number of life events had six times as many hospitalizations as children from the families with the lowest number of life events.

Based primarily upon this last study, one must conclude that there is reasonably good evidence that significant life events within the family have an adverse effect upon the physical health of preschoolers and that this effect appears to be nonspecific with an increase in a wide range of childhood illnesses. In Beautrais' study it appeared to be the parents' lack of support and supervision which accounted for much, but not all of the increased morbidity in the children.

PREGNANCY

Pregnancy is a condition which lends itself easily to studying the effects of family. It is easily diagnosed and there is no variation in the degree of the condition (dichotomous variable). The outcome can be clearly defined and reliably measured. Prospective studies can be done over a short period of time. Obstetrical risk factors which act as confounding variables are well known and measurable. Pregnancy is generally perceived as being stressful, and social supports in the form of the family may potentially buffer that stress and affect the outcome.

Two studies have examined the effects of the family through social supports on the outcome of pregnancy. Nuckolls et al. (143) found that psychosocial assets, a measure of psychological state, and social supports (including family) were associated with fewer obstetrical complications in women who had high levels of stress both during and before the pregnancy. This finding was in a small (26 subjects) subset of the population studied

N = 170). In addition, obstetrical risk factors other than parity, age, and social class were not examined.

A similar, but better designed study was done by Norbeck et al. (142). They used validated tools to assess life stress, social supports (from friends and family), and emotional equilibrium (anxiety, depression, and self-esteem), and examined significant obstetrical risk factors. Only when they divided the outcomes into types of complications (gestational, labor, and delivery and infant) did they find that high stress during the end of pregnancy and low social supports were associated with increased complications. However, very little of the variance in the complications was explained by psychosocial factors.

These two studies suggest that social supports may affect the outcome of pregnancy in women who have experienced many recent life changes. The effect appears to be small, and the contribution of the family is not clear.

COMPLIANCE

Many family physicians and health care professionals who work with families have argued that a family approach is likely to have its greatest impact on the health of individuals by improving compliance with medical treatments. It is well recognized that compliance is a serious problem, with 30-60% of patients not following physicians' recommendations. While in the days of blood letting and purging this may have been adaptive for survival, with more efficacious treatments available, it can have serious consequences.

Theoretically, the family should have a major influence on a family member's compliance. Most medical treatment requires a change in daily behavior which must often be maintained for long periods of time. Yet the physician may see the patient every month or so and is usually not aware whether the patient is following his or her recommendation. The family is often living with the patient and involved in his or her daily activities. They are in a powerful position to influence that behavior, either negatively or positively.

Haynes, Taylor and Sackett (79), in their excellent and encyclopedic review of the literature on compliance, cite 15 studies showing a positive correlation between the influence of family and compliance, six studies which show no correlation, and no studies which show a negative correlation. Unfortunately the studies are of poor design and all of them received low scores on their methodologic ratings. In addition, family influence is one of over 250 different variables which have been correlated with compliance. Compliance, like other illness behaviors, is very complex and multidetermined. It is difficult to determine which factors correlated with compliance actually play a causal role. By causal, I mean that the variable not only precedes the compliance behavior but, if changed, would result in a change in the compliance.

Most of the studi
a well-designed stud
spousal support an
Specific wife behav
lesterolemia and th
pliance. One possi
concern about his
and her beliefs. Th
the study. The wife
associated with co
with compliance. I
consider his wife's
minders as "naggi

Three less well-
mention. Steidl et
condition, compli
used a fairly relia
Evaluation Scale)
videotape. They f
sociated with the
functioning (stro
which respect inc
with compliance.
adherence were v

Oakes and co
found a correlati
of their families'
used the patient'
of his or her fa
risk factors enr
found that 80%
program as bei
gram, compare
attitude of thei
tudes are likely

Cohort or ca
variables prec
Primary Prever
and beliefs we
to be correlat
exclude the p
wife's suppor
factors (one o
for both the w

Most of the studies on compliance and the family are cross-sectional. In a well-designed study, Doherty et al. (58) found a strong correlation between spousal support and compliance with taking a cholesterol-lowering agent. Specific wife behaviors and her beliefs regarding the risks from hypercholesterolemia and the benefits from treatment were also correlated with compliance. One possible explanation of this finding is that the husband's concern about his condition and his compliance affected his wife's support and her beliefs. There is some support for this alternative conclusion from the study. The wife's "nagging" about taking the medication was negatively associated with compliance, while "reminding" was positively associated with compliance. If the husband was not complying, he was less likely to consider his wife's involvement as supportive, and may have viewed reminders as "nagging."

Three less well-designed cross-sectional studies on compliance deserve mention. Steidl et al. (196) examined the relationships between medical condition, compliance, and family functioning in patients on dialysis. They used a fairly reliable family assessment tool (Beavers-Timberlawn Family Evaluation Scale) in which family interactions are rated from a 30-minute videotape. They found that overall family functioning was significantly associated with the medical condition and that specific components of family functioning (strong coalition between parents, close family relationships which respect individuality, and warm affectionate mood) were associated with compliance. Unfortunately, the assessment of medical condition and adherence were very subjective, and both were done by the same physicians.

Oakes and colleagues (144) studied rheumatoid arthritis patients, and found a correlation between their use of a hand splint and their perception of their families' expectation that they wear the splint. The study not only used the patient's self-report on compliance, but also the patients' perception of his or her family's attitude. In a study of men with significant cardiac risk factors enrolled in an exercise program, Heinzelman and Bagley (82) found that 80% of the men who described their wives' attitude about the program as being positive had good or excellent compliance with the program, compared to 40% of the men who described a neutral or negative attitude of their wives. Again the participants' perception of spouses' attitudes are likely to be biased.

Cohort or case-control studies are necessary to determine whether family variables precede compliance. Doherty's study was part of the Coronary Primary Prevention Trial of cholesterol lowering agents. If the wife's support and beliefs were determined prior to the start of the trial and were found to be correlated with subsequent compliance by the husband, one could exclude the possibility that it was the compliance itself which affected the wife's support. However, it would not exclude the possibility that other factors (one or more of the 250 associated with compliance) could account for both the wife's support and the husband's compliance. The health beliefs

of the husband, the socioeconomic or educational status of the family, or the family's relationship with their physician might be confounding variables. In a prospective study, any factors known to be correlated with compliance which might affect the spouse would have to be controlled for. There are no published prospective studies on the family and compliance.

The most important study on the family and compliance compared a family educational intervention with two other educational interventions in improving compliance among hypertensives (139). The study was previously described under the Cardiovascular section of this paper. This study fulfilled the strictest methodologic criteria of Sackett and Haynes (183). It is a randomized controlled trial in which the interventions were described in detail and the outcomes included not only compliance (with medication and appointment keeping), but blood pressure and mortality. The results of the interventions were quite dramatic, with a 57% reduction in overall mortality for the experimental groups compared to the controls. It is not possible to conclude which of the three interventions was the most effective, or whether combining interventions was superior, but there was a trend toward family intervention having the best results.

A similar study by Earp et al. (62) examined whether adding family involvement to a home visit improved blood pressure compliance and control. Home visits (an average of five over 18 months) did improve blood pressure control at the 2-year follow-up, but encouraging a family member to actively participate in blood pressure monitoring did not improve blood pressure control any further. The failure of family involvement to improve blood pressure control may have been due to the short follow-up period of this study (only 6 months after the home visits stopped). The effect of home visits on compliance has been shown to disappear after the visits stopped, and it was hypothesized that family involvement would prolong the effect. Yet in this study the effect of the home visits did not disappear at 2 years and a longer follow-up may have demonstrated a difference.

Clinical trials of family involvement in the treatment of hypertension appear to be the most productive research in the area of family and compliance. Family involvement can include education, encouraging support or actively involving the family in the treatment process (e.g., monitoring blood pressure, changing the family's diet). These different interventions need to be compared to each other and to similar interventions with the individual patient to be sure that involving the family is making a difference. Family interventions in the home should be compared with office interventions which are less expensive and time consuming. Since both of the studies cited were done in clinics with lower socioeconomic populations, similar studies should be done in private offices with a broader mix of patients, to improve the generalizability of the results.

Overeating and
ronment in which
by behaviorists wh
the eating behavio
trials which involv
Saccone and Israe
program for obesi
vided by a signific
nell et al. (32) wer
in an obesity prog
weight loss. Ther
refused to be inv
domly allocated t
different types of
best results were
itoring, and reint
the group in whi
the treatment pr
the group in wh
illustrates how th
in some circumst
effect.

One must be c
program will al
trial of obese ad
participation in
weight reductio
were actively in
involved lost an
in their own sel
Understanding
and the family
in the child's li
harmful. One
any adolescent
independent. I
how to study t

Because of t
evidence for t
studies can a
behaviors, su
the family in

OBESITY

Overeating and obesity are thought to be influenced by the social environment in which one eats. Limited but significant success has been obtained by behaviorists who have manipulated those factors that seem to reinforce the eating behavior of obese patients. There have been several intervention trials which involve the families of obese patients in the treatment program. Saccone and Israel (181) improved weight loss in a behavioral treatment program for obesity when the monetary reinforcement for change was provided by a significant other (usually spouse) rather than the therapist. Brownell et al. (32) were able to demonstrate that the spouse's actual involvement in an obesity program, not simply a willingness to cooperate, increased the weight loss. There was no difference between the groups whose spouses refused to be involved and those whose spouses were willing but were randomly allocated to the nonparticipation group. Pearce et al. (162) compared different types of spousal involvement in an obesity treatment program. The best results were obtained when the spouse was trained in modeling, monitoring, and reinforcement techniques. The results were nearly as good in the group in which the spouses were instructed simply not to interfere with the treatment program. This nonparticipating spouse group did better than the group in which the spouses were not contacted at all. This last study illustrates how the family can interfere with a treatment program, and how, in some circumstances, limiting the family's involvement can have a beneficial effect.

One must be careful not to assume that family involvement in a treatment program will always be advantageous. Brownell et al. (33), in a treatment trial of obese adolescents, demonstrated the adverse effects of the mother's participation in her child's program. At a 1-year follow-up after an intensive weight reduction program, neither the obese adolescents whose mothers were actively involved in the program nor the ones whose mothers were not involved lost any weight. Only the group in which the mothers were involved in their own separate and concurrent group, did the adolescents lose weight. Understanding the life cycle tasks of the adolescent (need for individuation) and the family dynamics in some obese patients (mother's overinvolvement in the child's life), can explain why a mother's active involvement might be harmful. One would expect similar results from the family's involvement in any adolescent's treatment that did not respect the adolescent's need to be independent. It is important to consider the life cycle stages when deciding how to study the family's involvement in treatment.

Because of the experimental design of these studies, they offer persuasive evidence for the role of the spouse in the management of obesity. Similar studies can and should be done on the treatment of other maladaptive behaviors, such as smoking, inactivity, and Type A behavior. The role of the family in alcohol and drug abuse will be discussed later.