A Randomized Controlled Evaluation of an Educational Progam in Adults With High Psychosocial Risk of Morbidity

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This clinical trial tested the efficacy of a psychosocial intervention in a panel of white adults with a high level of recent stressful life changes and weak social supports. One hundred seventy users of three family practices were randomly assigned to receive a six-month educational program provided by a nurse practitioner or to a control group. Outcome variables were assessed over a 12-month follow-up period by mailed questionnaires and validated when possible by review of medical records. During the six months immediately following the intervention, recipients had a lower rate of restricted-activity days than controls. During the follow-up period, symptom experience, physical function, social function, and emotional function were similar in the two groups. While the overall improvement in social supports was not significantly better at the completion of the intervention for recipients than for controls, those recipients who developed strong supports had fewer restricted-activity days than those who continued to have weak supports. This educational program may provide temporary benefit to adults with high psychosocial risk for health impairment.

The distribution of morbidity within the population is not uniform but rather is highly variable with some individuals experiencing frequent or prolonged illnesses while others remain relatively free of impairment for long periods. There is growing recognition that conventional risk factors consistent with biologic concepts of disease explain only a part of this observed variance in morbidity.[1] Consequently, increased attention has been focused on the effects of the social environment on health, particularly on the possible adverse effects of stressful life changes and deficient social support resources.[2]

A longitudinal study of several thousand men conducted in the late 1940s and early 1950s found a clustering of illness events at times of substantial changes in life circumstances or experiences.[3] This study and other earlier studies suggested that life changes or events disrupted psychosocial homeostasis, creating a need for adaptation and enhancing vulnerability to illness. A significant advance in the investigation of the detrimental health effects of stressful life changes occurred in the 1960s, when Holmes and Rahe developed an objective instrument for the measurement of such changes.[4] This Social Readjustment Rating Scale and similar life events inventories have been employed in numerous studies, which have generally found that persons experiencing multiple stressful life events were at increased risk of developing a variety of illnesses.[5–7]

Evidence that weak social support resources have a deleterious effect on health has come from numerous sources, including experiences of migrants,[8,9] a study of unemployed men,[10] and several studies of depression and psychological status.[11–14] Three large population-based investigations found that social relationships and networks affected subsequent survival over follow-up periods ranging from 30 months to 12 years.[15–17] Considerable evidence suggests that the convergence of stressful life changes and deficient social resources constitutes a risk factor for health impairment.[18–24]

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There is a need for research that addresses the practical clinical application of this emerging knowledge to clinical medicine. This article reports the results of a randomized controlled evaluation of an intervention designed to reduce morbidity for adults with a high-risk psychosocial profile.

METHODS

Criteria for Eligibility

Criteria for high psychosocial risk were based on previous research.[24,25] Using a 40-item version of the Social Readjustment Rating Scale (SRRS) and applying normative weights developed for each item,[4] a 12-month life change score in excess of 175 constituted a high level of life changes. Social supports were measured using a 13-item index that assessed six dimensions of support: intimacy (two items), personal networks (three items), community networks (two items), satisfaction with relationships (three items), appreciation and understanding (two items), and tangible assistance (one item). A low score on at least three dimensions indicated weak overall social supports. The concurrence of a high level of life changes and a profile of weak supports qualified an individual for the study.

Selection of Subjects

White adults aged 21 to 59 years who were registered in any of the three family practice centers operated by the University of Missouri–Columbia were surveyed using a mailed questionnaire that contained the 40-item SRRS and the 13-item social supports index. These centers are located in neighboring mid-Missouri communities of 5,000, 12,000, and 60,000 people. Of the 6,069 questionnaires mailed, 638 were returned undeliverable and 1,848 were completed in usable form. Five hundred twenty-five of these respondents met the criteria for high psychosocial risk. They were then asked to complete a more extensive mailed questionnaire that assessed sociodemographic characteristics, health-related practices, and health status. Two hundred thirteen people responded to the second questionnaire, provided informed consent, and agreed to participate. Sixteen of these had recently moved from the area and were no longer eligible. An additional 22 respondents appeared to be significantly depressed on the basis of responses to several questions. These people were not included in the study but were strongly encouraged to seek medical or psychiatric evaluation. Both members of five couples agreed to participate and one of the two partners was randomly selected for inclusion. After these exclusions, 170 volunteers were available for randomization.

Randomization

Subjects were randomly assigned to either an experimental group that received the intervention or a control group. Subjects in the control group did not receive a placebo or sham experience; their participation consisted of responding to mailed questionnaires. As the task required of the experimental subjects was greater than that of the control subjects, higher attrition was expected from the experimental group. To assure relatively similar sized groups for the comparison of outcomes, the randomization was conducted so that each subject had a 55 percent chance of allocation to the experimental group. Ninety-three subjects were assigned to the experimental group and 77 to the control group.

The Psychosocial Intervention

The intervention consisted of a series of educational sessions provided by two family nurse practitioners over a six-month period. Principles of adult learning theory[26,27] were employed in the context of Norbeck's model of a nurse-based educational intervention.[28] Three integrated strategies were utilized: one-to-one individualized sessions, small-group sessions, and educational pamphlets. The intervention included three one-to-one sessions and five group sessions with the following temporal sequence: one-to-one, group, group, one-to-one, group, group, one-to-one, group. The intent of the intervention was education rather than counseling, psychotherapy, or the direct provision of social support. Intervention sessions focused on enhancement of self-esteem, improvement of communication, stress management and coping skills, and the development and use of supportive social resources.

One-to-one sessions lasted approximately one hour and served to assess individual needs and to identify and facilitate self-learning activities. At the initial session an educational plan was developed and a contract was negotiated. Progress was assessed at subsequent individual sessions, and adjustments or refinements in the plan were made when indicated.

The small groups were stable in membership and consisted of five or six subjects and a nurse practitioner, with nurse-subject continuity between the individual and group sessions. Subjects were assigned to groups on the basis of convenience and availability without consideration of demographic characteristics. Group sessions lasted approximately two hours. Discussions and activities within the group paralleled and modeled the tasks of giving, requesting, and receiving support in the everyday world. Structured group activities were designed to provide information, share feelings, improve interpersonal communications, and offer a setting for the practice of new behaviors. Each session had a specific theme or focus, which in tem-

poral order were an overview of stress, relaxation techniques, self-esteem, assertiveness, and communication skills.

Educational pamphlets were developed specifically for the program to supplement and reinforce concepts and behaviors addressed in the one-to-one sessions and group sessions. Each of the nine pamphlets discussed one of the following themes: social supports, friendship, depression, loneliness, grieving, relaxation, assertiveness, self-esteem, and positive self-statements.

Outcome Variables

Outcome data were collected over an 18-month period, starting with the onset of the intervention and extending for 12 months after its completion. Two types of outcomes were assessed: intermediary or explanatory outcomes and health status outcomes. Improvement in social supports was the intermediary outcome conceptualized as a mechanism for the hypothesized favorable effect of the intervention on health. Social supports and stressful life changes were assessed by mailed questionnaire at 6, 12, and 18 months using the previously described instruments.

The following health status outcomes were assessed by mailed questionnaire: symptom level, physical function, social function, and emotional function were measured by the 63-item Duke-UNC Health Profile[29] at 6, 12, and 18 months; hospital days, bed-disability days, restricted-activity days, and physician visits were measured at monthly intervals by a questionnaire adapted from the National Health Survey instrument.[30] Based on responses to the Duke-UNC Health Profile (DUHP), scores with a range of 0.0 (low) to 1.0 (high) were calculated for symptom level and physical, social, and emotional function, as previously described.[29] Hospital days consisted of days spent as a patient in a hospital. Bed-disability days included hospital days plus days spent in bed because of a medical problem. Restricted-activity days included bed-disability days plus days of missed work or school and days in which usual activity was reduced because of a health problem.

Medical records from the University of Missouri Hospital and Clinics and from the three family practices were independently reviewed by two family physicians who were blinded to the study status of the patients. Physician visits and hospital days were counted, diagnoses were recorded, and each outpatient visit was assessed with respect to severity of medical condition, using a scale of 1 (visit for preventive care) to 5 (visit for life-threatening condition). Interrecorder agreement for number of visits and hospital days and severity of condition each exceeded 90 percent. Medical records from alternative sources of care in the communities (two general hospitals and over 100 physicians) were not available for examination.

Control of Bias

The possibility of confounding of the effect of the intervention on outcomes by covariates was addressed by random assignment of subjects to study groups and by multivariate analysis. At base line, age, sex, marital status, family income, education level, employment status, the use of cigarettes and alcohol, and health status were measured. The following base line health status variables were assessed: self-reported presence of any of eight specified medical conditions (heart disease, asthma, ulcer, high blood pressure, arthritis, diabetes, cancer, and gallbladder or liver trouble); receiving medical care for an ongoing problem; self-rating of health as excellent, good, fair, or poor; and functional status measured by the DUHP. In analyzing the impact of the intervention on health outcomes, the New Regression Procedure of the *Statistical Package for the Social Sciences*[31] was used to control for the effects of base line characteristics. Multiple linear regression was performed with hospital days, bed-disability days, restricted-activity days, and physician visits as separate dependent variables.

It was expected that some subjects would receive counseling relating to their psychosocial status from sources of care outside the study. To the extent that this was background therapy that would have occurred in the absence of the study, it would be considered part of the control experience to which the effect of the intervention was compared. However, inclusion in the study may have sensitized controls to their psychosocial risk and motivated them to seek some form of counseling or therapy, thus introducing a contamination bias, which could reduce or obscure a beneficial effect of the intervention. To explore this possibility, subjects were asked at the end of the study whether they had received counseling during the 18-month study period. At the same time, the 312 respondents to the first questionnaire who met eligibility criteria for psychosocial risk but chose not to participate in the study were surveyed by mailed questionnaire and asked about their use of counseling services during the preceding 18 months. Ninety-six of them provided this information and the frequency of counseling among the study controls was compared with the frequency among this group.

The possibility of a reporting bias was a major concern in this study. There was no placebo or sham experience for the controls; subjects were aware of their experimental or control status in the study, and most outcomes were based on self-report. Any propensity for the experimental subjects to underreport or control subjects to overreport morbidity would have created systematic errors in the

assessment of outcomes. The possibility of such a reporting bias was explored by comparing the proportions of physician visits and hospital days reported by experimental subjects and control subjects that were documented by medical records.

The appropriate management of noncompliant subjects in the data analysis is a major issue in clinical trials.[32] As the objective of this study was to assess the efficacy of an educational program, only those subjects who received a sufficient dose of the program were considered to have received the intervention. This threshold level of exposure was arbitrarily set at five sessions. The decision to exclude noncompliers may compromise the effect of randomization and introduce a confounder, as adherence to a task may lead to better outcomes independent of the effects of the task (intervention).[33] This possible bias was examined by comparing compliant and noncompliant subjects with respect to base line characteristics and outcomes.

Statistical Analysis

Tests of statistical significance consisted of Student's *t* test for differences in means, chi-square analysis for differences in proportions, and F values for results of multivariate analysis. All tests of statistical significance were two-tailed.

RESULTS

Base Line Characteristics

Of the 93 subjects assigned to the experimental group, 34 attended all eight of the intervention sessions and an additional 31 attended at least five. Of these 65 subjects who received the intervention, 61 responded to at least 15 of the 18 monthly questionnaires. Sixty-two of the original 77 controls responded to at least 15 monthly questionnaires. Evaluation of the intervention is based on comparisons of these groups of 61 and 62 subjects.

The distribution of base line characteristics for the original groups and the compliant groups is displayed in Table 1. For both experimental and control groups, characteristics of the compliant groups were similar to those of the original groups. Compliant experimental subjects were similar to compliant control subjects with respect to base line characteristics except for employment status and education level. A higher proportion of the experimental group was employed and a lower proportion had completed college.

Psychosocial Outcomes

There were no differences between the study groups in mean life change scores at 6, 12, or 18 months. At six months 31 percent of the experimental subjects and 21 percent of the control subjects were low in less than three dimensions of social supports and were thus considered to have high supports. At 12 months 36 percent of the experimental subjects and 33 percent of the control subjects had high supports, while at 18 months the respective rates were 33 percent and 41 percent. None of these differences was statistically significant.

Health Status Outcomes

Self-reported morbidity and physician utilization for experimental and control groups were compared for three six-month periods: September 1983 through February 1984, March through August 1984, and September 1984 through February 1985. The intervention was provided during the first of these periods. Any effect of the intervention was expected to be most evident during the second period.

Mean morbidity days and physician visits (per person per month) and standardized beta coefficients and P values from the multiple regression analysis are displayed in Table 2. Except for hospital days during the first period, morbidity days and physician visits were consistently lower for the experimental group; the difference in restricted-activity days for the second period was statistically significant. This association of the intervention with fewer restricted-activity days remained significant after controlling for age, sex, marital status, employment status, socioeconomic status, cigarette smoking, and health status by multiple regression. The effect of the intervention on morbidity was similar for men and women.

Medical records from the University of Missouri Hospital and Clinics and from the family practice centers were reviewed by two physicians who were unaware of the study status of the patients. For the 18-month study period, intervention recipients averaged 5.1 and control subjects averaged 6.0 physician visits, a difference that was not statistically significant. Medical severity was rated as high (score of 4 or 5) in 2.9 percent of experimental visits and 5.6 percent of control visits (P = .09). Eight intervention recipients had a total of 24 days of hospitalization and 12 control participants had a total of 60 hospital days during the 18 months. There was one known death among the original panel of subjects; a 49-year-old man in the control group committed suicide while under psychiatric care.

To explore the hypothesized intermediary effect of social supports, intervention recipients with high social supports at the completion of the intervention were compared with those with low supports. The 19 recipients with high supports at six months had a mean of .47 restricted-activity days per person per month during the subsequent six-month period compared with a mean of 1.1 for the 42 recipients who continued to have low supports (*t*

TABLE 1. BASE LINE CHARACTERISTICS OF EXPERIMENTAL AND CONTROL SUBJECTS

Characteristic	Experimental		Control	
	Original (n = 93)	Compliant (n = 61)	Original (n = 77)	Compliant (n = 62)
Sociodemographic	(%)	(%)	(%)	(%)
Age (years)				
20–29	34	30	39	36
30–39	41	43	32	34
40–49	16	18	13	15
50–59	9	10	16	16
Sex: female	73	71	77	77
Marital status: married	53	56	61	65
Education				
≤12 years	20	15	24	17
13–15 years	33	37	15	18
≥16 years	47	48	61	65
Income				
<$10,000	20	16	20	15
$10,000–$19,999	33	34	33	38
$20,000–$29,999	20	23	24	21
≥30,000	27	26	24	26
Employment				
None	18	10	28	25
Part time	13	15	16	15
Full time	69	75	56	60
Health status and health-related habits				
Medical condition present	36	38	36	37
Receiving medical care	29	33	31	32
Self-rating of health as fair or poor	14	8	13	13
Cigarette smoker	33	27	22	19
Daily intake of alcohol	13	13	17	18
Mean life change and functional status scores	Score	Score	Score	Score
Life change	308	318	312	299
Symptom	.85	.85	.84	.85
Function	.85	.86	.84	.84
Social function	.80	.80	.80	.80
Emotional function	.69	.69	.69	.70

= 2.10, P = .04). Among control subjects there was a trend in the same direction.

There were no differences between the experimental and control groups in mean scores for symptoms, physical function, social function, and emotional function as measured by the DUHP at 6, 12, or 18 months.

Assessment of Potential Bias

There was no evidence of biased reporting of physician visits or hospital days by subjects. Experimental subjects reported 83.1 percent and control subjects reported 84.6 percent of physician visits documented in the medical records. All hospital days documented in the charts were reported by subjects. There was also no evidence of contamination produced by excessive exposure of control subjects to counseling from sources outside the study.

Several findings suggested that the exclusion of subjects from the analysis of intervention effects did not introduce a major bias. First, medical records indicated that noncompliant subjects did not have higher rates of physician utilization or hospitalization than compliant subjects. Second, noncompliant subjects had similar base line sociodemographic and health characteristics as compliant subjects. Third, 14 of the 28 original experimental subjects who did not receive the intervention did respond to at least 15 monthly questionnaires. Their morbidity and physician utilization rates for the three six-month periods were similar to rates for the compliant control subjects and were slightly higher than those for the recipients of the intervention. This outcome pattern suggests, at least for these 14 subjects, that noncompliance with the intervention was not a marker for high morbidity. Finally, combining these 14 subjects with the compliant experimental subjects and comparing outcomes to those of the

TABLE 2. MORBIDITY OUTCOMES FOR THREE SIX-MONTH PERIODS

Outcome*	Experimental	Control	Standardized Beta**	P Value for F Statistic
First 6 months				
Hospital days	.11	.08	−.065	>.1
Bed-disability days	.51	1.04	.175	.06
Restricted-activity days	2.76	3.54	.103	>.1
Physician visits	.51	.65	.014	>.1
Second 6 months				
Hospital days	.02	.09***	.186	.06
Bed-disability days	.28	1.03	.165	.08
Restricted-activity days	1.34	2.85†	.232	.02
Physician visits	.38	.57***	.141	>.1
Third 6 months				
Hospital days	.04	.09	.080	>.1
Bed-disability days	.46	1.22	.147	>.1
Restricted-activity days	2.34	3.06	.109	>.1
Physician visits	.39	.57***	.099	>.1

** Expressed as mean number of events per person per month*
*** or experimental status after controlling by linear multiple regression for age, sex, marital status, socioeconomic status, employment status, base line health status, and cigarette smoking*
****P ≤ .1, † P ≤ .05 for differences of means by Student's t test*

compliant control group did not substantially alter the results presented in Table 2.

DISCUSSION

The intervention evaluated in this trial was based on adult learning theory and was designed to have sufficient potency to effect clinically significant outcomes while having practical applicability to primary care. The intervention at most appeared to have a modest and probably transient effect on morbidity. The mechanism of this effect is not completely clear. It was hypothesized that the intervention would improve social supports, which in turn would lead to a reduction in morbidity. At no time during the follow-up did the intervention recipients have stronger social supports than the controls. Recipients who reported high supports at the completion of the educational program, however, had a lower rate of restricted activity in the second six-month period than those who continued to have low supports. This finding suggests that improvement in social supports had some intermediary effect on health status. As expected, life change scores did not differ between the groups; the emphasis of the intervention was on coping with stress rather than avoiding stressful events.

It is possible that exposure to the intervention resulted in clinically significant changes in social supports that were not detected by the instrument used. A variety of measures of social supports has been used with none as yet gaining widespread acceptance. There remain many theoretical, conceptual, and methodological problems with the assessment of social supports.[34,35] The conceptual frameworks of Cassel[2] and Cobb[36] and the empirical work of Berkman and Syme[15] and Henderson et al[37] guided the development of the index used in this study. This instrument assesses both the quality and quantity of supports, and scoring is based on the view that people who are concurrently low in several dimensions of supports are at increased risk of health problems.

The possibility needs to be considered that the apparent association of the intervention with lower restricted-activity days during the second six-month period was secondary to random error. It is unlikely that this association is a spurious chance finding, resulting from repeated assessments and comparisons of outcomes. As displayed in Table 2, experimental subjects consistently tended to have lower morbidity and utilization than control subjects. In 11 of the 12 comparisons in Table 2, outcomes were more favorable for the experimental group. In some cases rates for control subjects were two to three times higher than those for the experimental group. That only one of these differences attained a conventional level of statistical significance does not discount the strong composite trend evident in these comparisons.

The temporal pattern of morbidity was also consistent with a real effect of the intervention. Morbidity rates for control subjects remained relatively stable from period to period, whereas rates for the experimental subjects declined during the second period and rose to some extent

in the third. This pattern suggests that the effect began while the intervention was in progress, was maximal during the following six months, and then waned to some extent. In addition, restricted-activity days included hospital days and other bed-disability days; thus this variable aggregated illness events across a spectrum of severity. A sufficient number of events were accumulated to manage statistically the effects of random variation when comparing the two relatively small study groups.

The educational program had no demonstrable effect on functional status as measured by the DUHP. This instrument was found to have acceptable reliability and validity when tested on ambulatory patients in a primary care setting.[29] There are several possible explanations for the negative findings in this study. First, the intervention may have had no effect. Second, the instrument may not be sufficiently sensitive to subtle but clinically important changes in health status. Alternatively, the juxtaposition of this negative finding with the apparent favorable effect on restricted activity suggests that the intervention may have affected illness behavior more than actual health status. Perhaps the educational program reduced the propensity of stressed individuals to restrict their usual activities in response to a health problem.

Nonadherence of subjects to their expected tasks in the study constitutes a major problem in clinical trials.[32] Two forms of noncompliance occurred in this study, failure to respond to questionnaires and failure of subjects assigned to the experimental group to receive the intervention. As the rates of noncompliance with reporting were similar for the study groups, failure to respond to the questionnaires was unlikely to create a bias. The second type of noncompliance is more serious and poses a dilemma. Counting these noncompliant subjects as having received the intervention would dilute and possibly obscure an effect of the intervention. Excluding them from the analysis, however, might introduce a confounder. As recommended by Sackett,[32] the decision was determined by the basic objective of the study. Because this study assessed the efficacy of the educational program, only those who actually received it were included in the analysis.

Generalizability of study findings to other providers and to other patient populations needs to be addressed. In a complex, behaviorally oriented intervention, it is difficult to distinguish the effects of the intervention from the effects of the specific provider. Personal characteristics of the provider relating to attitude, enthusiasm, and style may be enmeshed with the content of the program and may profoundly influence the impact of the intervention. People with psychosocial risk may be particularly responsive to favorable attention from a professional. One strategy to minimize this effect is to provide a placebo or sham experience for a control group. Creating a placebo that controls for personal qualities of the provider while remaining inert in terms of educational value is a major logistical challenge. Because of difficulties in formulating an inert sham experience and of sample size constraints, a placebo control group was not included in this study.

As in most clinical trials, this study was limited to volunteers, people who consented to randomization, to participate in the intervention if so selected, and to provide information about themselves on a regular basis. The inevitable selection biases accruing from this process of sample construction limit generalizability of findings. In practice, however, this intervention will not be provided on a random basis but instead will be provided selectively to patients with psychosocial need who are willing to participate. Study subjects were exclusively white and tended to be female, young, college educated, and employed. The efficacy of the intervention in a population with a different demographic profile remains to be determined.

In recent years considerable attention has been directed to the effects of the social environment on health. As is frequently the case, this evaluation of a psychosocial intervention has yielded ambiguous results. While the efficacy of the stress management program is certainly not clearly demonstrated, the findings tentatively suggest a modest, probably temporary beneficial effect, which is in part mediated by an improvement in social supports. Whether the apparent effect can be sustained by including in the intervention program ongoing periodic contacts of the high-risk individual with the nurse is a subject for future research. Many conceptual and methodological issues involved in the systematic exploration of behavioral and psychosocial phenomena remain unresolved. The family practice setting provides opportunities for further exploration of the effects of the social environment on health.

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References

1. Syme SL, Berkman LF: Social class, susceptibility, and sickness. Am J Epidemiol 1976; 104:1–8
2. Cassel JC: The contribution of the social environment to host resistance. Am J Epidemiol 1976; 104:107–113.
3. Hinkle LE, Wolff HG: Ecological investigations of the relationship between illness, life experiences, and the social environment. Ann Intern Med 1958; 49:1373–1378.
4. Holmes TH, Rahe RH: The social readjustment rating scale. J Psychosom Res 1967; 11:213–218
5. Gunderson EK, Rahe RH: Life Stress and Illness. Springfield, Ill, Charles C Thomas, 1974
6. Dohrenwend BS, Dohrenwend BP (eds): Stressful Life Events: Their Nature and Effects. New York, John Wiley & Sons, 1974

7. Rahe RH, Arthur RJ: Life change and illness studies: Past history and future directions. J Human Stress 1978; 4:3–15
8. Cassel J, Tyroler HA: Epidemiological studies of culture change: I. Health status and recency of industrialization. Arch Environ Health 1961; 3:25–33
9. Marmot MG, Syme SL, Kagun A, et al: Epidemiologic studies of coronary heart disease and stroke in Japanese men living in Japan, Hawaii and California: Prevalence of coronary and hypertensive heart disease and associated risk factors. Am J Epidemiol 1975; 102:514–525
10. Gore S: The effect of social support in moderating the health consequences of unemployment. J Health Soc Behav 1978; 19: 157–165
11. Lin N, Ensel WM, Simeone RS, Kuo W: Social support, stressful life events, and illness: A model and an empirical test. J Health Soc Behav 1979; 20:108–119
12. Schaefer C, Coyne JC, Lazarus RS: The health-related functions of social support. J Behav Med 1981; 4:381–405
13. Aneshensel CS, Stone JD: Stress and depression: A test of the buffering model of social support. Arch Gen Psychiatry 1982; 39: 1392–1396
14. Hall LA, Williams CA, Greenberg RS: Supports, stressors, and depressive symptoms in low-income mothers of young children. Am J Public Health 1985; 75:518–522
15. Berkman LF, Syme SL: Social network, host resistance, and mortality: A nine-year follow-up study of Alameda County residents. Am J Epidemiol 1979; 109:186–204
16. Blazer DG: Social support and mortality in an elderly community population. Am J Epidemiol 1982; 115:684–694
17. House JS, Robbins C, Metzner HL: The association of social relationships and activities with mortality: Prospective evidence from the Tecumseh Community Health Study. Am J Epidemiol 1982; 116:123–140
18. Nuckolls KB, Cassel JC, Kaplan BH: Psychosocial assets, life crisis, and the prognosis of pregnancy. Am J Epidemiol 1972; 95: 431–441
19. Norbeck JS, Tilden VP: Life stress, social support, and emotional dysequilibrium in complications of pregnancy: A prospective, multivariate study. J Health Soc Behav 1983; 24:30–46
20. Boyce WT, Jensen EW, Cassel JC, et al: Influence of life events and family routines on childhood respiratory tract illness. Pediatrics 1977; 60:609–615
21. Ruberman W, Weinblatt E, Goldberg JD, et al: Psychosocial influences on mortality after myocardial infarction. N Engl J Med 1984; 311:552–559
22. Eaton WW: Life events, social supports, and psychiatric symptoms. A reanalysis of the New Haven data. J Health Soc Behav 1978; 19:230–234
23. Turner RJ: Social support as a contingency in psychological well-being. J Health Soc Behav 1981; 22:357–367
24. McKay DA, Blake RL Jr, Colwill JM, et al: Social supports and stress as predictors of illness. J Fam Pract 1985; 20:575–581
25. Blake RL Jr, McKay DA: A single-item measure of social support as a predictor of six-month morbidity. J Fam Pract 1986; 22:82–84
26. Srinivasan L: Perspectives on Non-Formal Adult Learning. New Haven, Conn, World Education Publishers, 1977
27. Knox AB: Adult Development and Learning. San Francisco, Josey-Bass, 1977
28. Norbeck JS: Social support: A model for clinical research and application. Adv Nurs 1981; 3:43–59
29. Parkerson GR, Gehlback SH, Wagner EH, et al: The Duke-UNC Health Profile: An adult health status instrument for primary care. Med Care 1981; 19:806–823
30. Disability Days United States 1975, Data from the National Health Survey. In National Center for Health Statistics (Hyattsville, Md). Vital and Health Statistics, series 10, No. 118. DHEW publication No. (PHS)78-1546. Government Printing Office, 1978
31. Hull CH, Nie NH: Statistical Package for the Social Sciences, Update 7-9. New York, McGraw-Hill, 1981
32. Sackett DL: The competing objectives of randomized trials. N Engl J Med 1980; 303:1059–1060
33. The Coronary Drug Project Research Group: Influence of adherence to treatment and response of cholesterol on mortality in the Coronary Drug Project. N Engl J Med 1980; 303:1038–1041
34. Broadhead WE, Kaplan BH, James SA, et al: The epidemiologic evidence for a relationship between social support and health. Am J Epidemiol 1983; 117:521–537
35. Bruhn JG, Philips BU: Measuring social support: A synthesis of current approaches. J Behav Med 1984; 7:151–169
36. Cobb S: Social support as a moderator of life stress. Psychosom Med 1976; 38:301–314
37. Henderson S, Byrne DG, Duncan-Jones P, et al: Social relationships, adversity, and neurosis: A study of associations in a general male population sample. Br J Psychiatry 1980; 136:574–583