

# Social Supports and Stress as Predictors of Illness

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The incidence and pattern of self-reported illness were studied over a six-month period in panels of 292 women and 188 men categorized by their experience of stressful life changes and their perceived supportive relationships. Men and women with more than average stressful changes had a risk of illness 1.6 and 1.8 times that reported by those with below-average changes. Analysis of the interaction of stressful changes with social supports showed that women with a combination of high changes and low supports experienced 2.5 times the rate of illness as those with low changes and high supports. This interaction was not found for men. A monthly rating of perceived life stress was correlated with subsequently recalled life changes for both men and women. The findings for women are consistent with the hypothesis that the interaction of stress with degree of social support is an important predictor of illness experience.

Physicians have long noted that only part of the explanation of why people become sick or remain well is biological.<sup>1,2</sup> The way that sickness clusters in families,<sup>3</sup> in populations,<sup>4</sup> and in the course of individual lives<sup>5</sup> suggests that social factors also are important in determining susceptibility. The risk of illness appears to be increased among persons subjected to stressful life changes<sup>6,7</sup> and among those with relatively few supportive social relationships.<sup>8,9</sup>

The late John Cassel<sup>10</sup> proposed that social influences on host resistance should be considered as having two dimensions: "stressors" that increase susceptibility and "supports" that buffer the individual from potentially harmful exposures. Available data on mental illness,<sup>11</sup> complications of pregnancy,<sup>12</sup> and childhood respiratory condi-

tions<sup>13</sup> suggest that high illness rates are associated with stressful experiences only when social supports are concurrently few.<sup>14</sup>

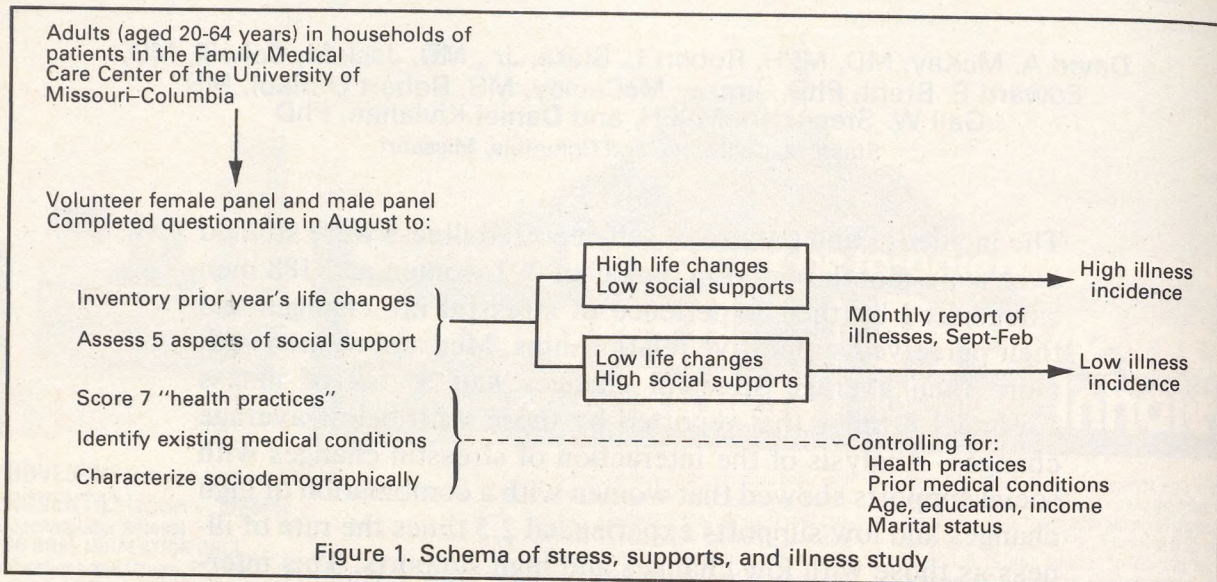
Despite growing interest in the possible interaction of stress and supports in predicting illness, there has been little prospective study of the general illness experience of adults following their categorization by levels of stress and social supports.<sup>15</sup> A panel study was therefore devised to test the hypothesis that men and women who recently have had to adjust to many changes in their lives and who have relatively few supportive relationships will be at greater risk of subsequent illness than those who experience fewer changes and enjoy more supports.

## Methods

The schema of the study is summarized in Figure 1. The University of Missouri-Columbia Family Practice Center in the summer of 1980 sent

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family registry forms to over 4,000 households where someone had used the center in the prior two years. All (1,770) adults listed in the 958 forms returned by August were then invited to join a six-month study on "health and ways of living"; 659 persons in 467 families volunteered. Of these, 530 (80 percent) completed initial and final questionnaires and at least five of six monthly mailed reports on illness and stress. Small numbers of out-of-county residents, nonwhites, and persons aged under 20 or over 65 years were excluded from analysis to diminish potential confounding.<sup>16</sup> A panel for each sex was drawn with no more than one person per panel taken from any one household. The resulting panels of 292 women and 188 men were analyzed separately.

Illnesses among study participants were identified by using questions and definitions adapted from the National Health Survey.<sup>17</sup> Participants reported by mail each month the number of days they spent in the hospital, in bed, absent from work or school, or with restricted activity because of self-defined illness. These days were summed over the six-month follow-up period to obtain the total illness days for each person. The monthly report included the number of physician visits made during the month and the condition that led to limiting activity or to consulting a physician.

The frequency distributions of illness-day counts were skewed, with many individuals reporting few or no such days. Consequently, illness was assessed as a categorical (high vs low) rather than as a continuous variable. About one third of the participants were found to have an incidence of illness days greater than the median reported by a comparably aged national sample.<sup>17</sup> The occurrence of illness at this rate—nine or more illness days per six months—was thus used as the principal dependent variable. About one third of participants also had four or more days ill in bed either in a hospital or at home in six months. This rate of bed disability was also utilized as a dependent variable.

The initial questionnaire assessed potentially stressful life changes experienced during the preceding 12 months using a 40-item adaptation of the Social Readjustment Rating Scale of Holmes and Rahe.<sup>18</sup> Participants were asked to rate each event on a four-point scale indicating "how hard it was to get used to" that change. Each reported item was weighted by this subjective rating, the weighted items were summed, and the individuals were classed as being above or below the median score. The complete initial questionnaire, including this recall and weighting of stressful experiences, was repeated at the end of the study.

The monthly illness-report questionnaire also



provided a subjective assessment of stress, asserting "there are many different feelings people may have that they call *stress*—feelings of pressure or tension, feelings of being upset, frustrated, hassled, pushed, anxious." Participants were then asked to rate from 0 (no stress) to 5 (high stress) their own sense of overall life stress during the preceding month. The median monthly stress ratings given by each person during the whole six-month follow-up and during months 1 through 3 and months 4 through 6 were used as separate measures of stress for comparison with life change scores.

Social supports were assessed using a summary score derived from questions about the following five components of supportive relationships: personal networks, community networks, intimacy, appreciation-understanding, and satisfaction-loneliness. Personal networks assessed how many friends and how many relatives the participants felt close to and how many of these people would be seen in a typical month. Responses were classed as high (greater than 5), medium (2 to 5), or low (1 or none). Roughly one third of respondents fit in each category. Community networks rated the frequency of participation in church or in other group activities. Fifty percent of participants reporting an average of at least once per week were designated high, and the 50 percent reporting less were designated low. Intimacy was scored as high for the 50 percent reporting a regularly available confidant with whom feelings and concerns were shared "most every day." The 50 percent without a confidant or with sharing only "sometimes" or "rarely" were scored as low. For appreciation-understanding, 52 percent of subjects reported on separate questions that they received deserved appreciation and needed understanding from people close to them "most of the time" and were categorized as high. Those reporting less appreciation or understanding were categorized as low. For satisfaction-loneliness, 56 percent reported satisfaction with their present amount of contact with friends, relatives, and intimates and, consequently, were rated high in contrast with the 44 percent wanting more contact or noting loneliness as a problem.

Ratings on these five component scores were then combined into a summary social support score that divided both panels into approximate

thirds. Thirty-three percent of women and 35 percent of men were high in three or more of the five component scores and thus were classed as high in overall social supports. The 31 percent of either sex who were low in three or more components were classed as low; the 35 percent of women and 33 percent of men with intermediate component scores were classed as medium.

The study hypothesis was tested by comparing the risk of high illness incidence among those individuals in the lower one third for social supports and the upper one half for life changes (the hypothesized high-risk group) with that found among those in the upper one third for social supports and the lower one half for life changes (the hypothesized low-risk group).

Effects of preexisting illness or of sociodemographic factors, such as age or education, might influence both the rate of illness and stress-support measures and thereby confound differences in illness incidence associated with stress and supports. To control for this potential confounding, individuals in high-risk and low-risk groups were stratified by each of six control variables: prior medical condition, health practices, age, income, education, and marital status. Data on prior medical conditions were derived from several questions about chronic illness and disability obtained at the time the study began. Other questions about exercise, weight, sleep, eating habits, smoking, and alcohol use were adapted using the Belloc-Breslow<sup>19</sup> scoring system as a measure of health practices.

P values are based on standard chi-square testing (with one degree of freedom) of the 2 × 2 distribution of high-low illness incidence by the hypothesized high-low risk groups. The Mantel-Haenszel chi-square procedure was used with the stratified analysis for confounding effects.<sup>16</sup>

## Results

Study participants were relatively young, well-educated midwesterners of European lineage. Of the female and male panels, respectively, 60 and 72 percent were college graduates, 51 and 58 percent had family incomes above the county median, 76 and 87 percent were currently married, and 53



**Table 1. Incidence of High Illness (HI) Experience Among Women (N = 292) Cross-Classified by Level of Stressful Life Changes and Social Supports**

Social Support Score	Life-Change Score		Total % HI (n)
	Low % HI* (n)	High % HI (n)	
Low	31 (48)	55 (43)	42 (91)
Medium	25 (44)	44 (59)	36 (103)
High	22 (54)	39 (44)	30 (98)
Total	26 (146)	46 (146)	36 (292)

\*Percentage with high illness incidence, i.e., nine or more days of illness during the six-month follow-up. The boxed cells indicate the hypothesized high-risk and low-risk groups. Thus of the 43 high-risk women (those with high life change and low social support) 55 percent had nine or more illness days compared with 22 percent of the 54 low-risk women

and 42 percent were under the age of 33 years.

Table 1 displays the percentage of women who reported nine or more days of illness-restricted activity over the six-month follow-up period, cross-classified by stressful life change (change) and social support (support) scores. Women with high change scores had 1.8 times the likelihood of a high rate of illness ( $\chi^2 = 12.5$ ,  $P < .001$ ). There was also a trend for women with low support scores to have a high rate of illness ( $\chi^2 = 3.1$ ,  $P < .1$ ).

The group of women hypothesized to be at highest risk (those with both high change and low support scores) was 2.5 times more likely to have a high incidence of illness than was the group hypothesized to be at low risk (those with low change and high support scores) ( $\chi^2 = 10.9$ ,  $P < .001$ ).

The data for bed disability days (not shown) had a similar pattern. The high risk women were 1.8 times more likely than the low risk women to spend four or more days ill in bed over the six-month period ( $\chi^2 = 6.23$ ,  $P < .02$ ).

Of the potential confounders considered—presence or absence of a prior medical condition, age, education, household income, marital status, and health practices—only the presence of a prior medical condition was actually associated with a higher incidence of illness. Table 2 indicates that the relative risk of illness associated with change

and support was nearly the same whether prior medical conditions were present (61 percent/26 percent = 2.3) or absent (48 percent/19 percent = 2.5). The association of high change and low support with high illness in women was independent of the effect of baseline health status. The Mantel-Haenszel chi-square analysis for each of the six control variables confirmed the lack of confounding.

The pattern as well as the frequency of illness differed between the high-risk and low-risk women. Illness was noted in 52 percent of 253 months reported by the high risk group compared with 16 percent of the 316 months reported by the low-risk group ( $P < .001$ ). These episodes were mostly attributed to "cold" or "flu," which occurred 1.4 times more frequently in the high-risk women; with such an episode, they were twice as likely as low-risk women to consult a physician but were no more likely to spend time in bed. The high-risk women were also six times as likely to report musculoskeletal complaints and ten times as likely to report fatigue, emotional, or situational problems as the basis for their disability. Overall, the high-risk group utilized physicians at 1.5 times the rate of the low-risk group ( $P < .05$ ).

For men (Table 3) the relative risk of a high illness rate associated with high life-change score was 1.6 ( $P < .05$ ). This pattern is similar to that



noted for women in Table 1. The relationship of illness to social supports, however, was different. In contrast with women, men with high change and high support scores were 2.8 times more likely to have high illness rates than were those with low change and low support scores. The illness rates for men in Table 3 do not show the gradient seen for women of increasing risks with intermediate levels of support. For men there were no significant relationships of illness type, physician use, or bed disability days with life change and social support scores.

The median monthly rate for perceived stress during the study was correlated with the six-month life-change score assessed at the end of the study ( $r = .41$ ,  $P < .001$ , for women and for men). This month-by-month stress rating also provided a second test of the principal hypothesis. Women with low support scores at the beginning of the study and with an above average (3, 4, or 5) median monthly stress rating for the first three months of the study were 2.3 times as likely to have five or more days of illness during the second three months of the study as were women with initial high support and a below average (0, 1, or 2) median stress rating ( $\chi^2 = 12.3$ ,  $P < .001$ ). Men with high stress ratings in the first three months were 1.8 times as likely to have high illness rates in the second three months, but, again, for men there was no significant interaction with measures of support.

## Discussion

Relatively few individuals account for a high proportion of the illness and disability in a population.<sup>1</sup> Much of that morbidity derives from subjective experiences of discomfort and dysfunction that often have an uncertain relationship to objectively defined disease.<sup>2</sup> Yet, regardless of the diagnosis, people who feel they are ill behave accordingly with a resultant increase in disability, use of costly health services, and decreased work productivity. There is increasing evidence that social factors influence the risk of disease and death<sup>9,20,21,22</sup> as well as the frequency of symptoms and visits to physicians.<sup>23,24</sup> The physician needs to understand the basis of both subjective illness

**Table 2. Incidence of High Illness (HI) Experience Among High- and Low-Risk Women Stratified by Presence or Absence of a Prior Medical Condition**

	Prior Medical Condition	
	Present % HI* (n)	Absent % HI* (n)
High risk (high change, low support)	61 (23)	48 (21)
Low risk (low change, high support)	26 (23)	19 (31)
Risk ratio	2.3	2.5
	$P < .01^{**}$	

\*Percent with high illness incidence (nine or more days per six months).  
 \*\*Probability, by the Mantel-Haenszel chi-square test, for the significance of the illness risk ratio between high-risk and low-risk women across strata of the control variable

and objective disease. Both have important social determinants.<sup>25</sup>

In this study the risk of illness manifested by restricted activity was associated with stressful life changes for both men and women. For women, the concurrence of such changes with low social supports further increased the risk of illness. All three of these measures—illness, life change, and social support—involve subjective perceptions. It is possible that the observed association could result from a compounded reporting bias with the high-risk group exaggerating their experience and recalling more illness and physician visits, giving higher ratings to their changes and feelings of stress, and (for women) reporting fewer supports. To minimize this bias, most questions emphasized concrete events and relationships. But the important point may be that the high-risk group did perceive themselves as ill (and as experiencing stress with little support). Accordingly, they responded with more restricted activity and physician visits. It is noteworthy that a large cohort study recently found perceived health to be predictive of mortality independent of other social and health measures.<sup>26</sup>

The life change inventory approach to assessing



**Table 3. Incidence of High Illness (HI) Experience Among Men (N = 188) Cross-Classified by Level of Stressful Life Changes and Social Supports**

Social Support Score	Life-Change Score		
	Low % HI* (n)	High % HI (n)	Total % HI (n)
Low	17 (23)	33 (36)	27 (59)
Medium	29 (41)	29 (21)	29 (62)
High	21 (34)	48 (33)	34 (67)
Total	23 (98)	38 (90)	30 (188)

\*Percentage with high illness incidence (nine or more days per six months)

stress has remained controversial despite widespread use.<sup>7</sup> The score used in this study weighted events by the subject's sense of the degree of readjustment required, but substitution of the normative weights developed by Holmes and Rahe<sup>18</sup> does not alter the pattern seen in Table 1 and Table 3. The mean annual number of events reported by study participants (8.4) is comparable with that found for other general population groups studied with similar inventories.<sup>27</sup> The correlation coefficients for events recalled for the same six-month period at its end and six months later ( $r = .61$  for number of events,  $r = .68$  for the subjectively weighted score) were similar to those found in test-retest studies by Rahe.<sup>6</sup> The correlation found in this study between prospectively reported stress ratings and recalled stressful events for the same period supports the use of the inventory as an indicator of the overall experience of stress.

Methods of assessing supportive relationships have varied widely and likewise remain controversial.<sup>28-31</sup> Social supports here were defined as the individual's perceived involvement in personal and group relationships combined with a sense of receiving satisfying emotional feedback from intimates and associates. Small space and cluster analyses of the responses to questions provided empirical support for the five components postulated, with no difference between men and women. A summary support measure was used that classed participants as having relatively strong, weak, or intermediate supports of several

types. For women, the summary support score indeed predicted illness risk better than any of the five component scores. For men, neither the summary nor any of the component support scores was predictive of illness.

Since many life changes alter supportive relationships, it has been questioned whether change and support indices should be considered as separate, interacting variables rather than as simply elaborate measures of the same phenomenon.<sup>30,31</sup> Several results of this study diminish this concern. The pattern of interaction in predicting illness between supports (assessed at the beginning of the study) and stress is the same whether stress is measured as changes recalled over the prior year or as perceived stress rated during the following three months. Either of these measures of stress predicts illness almost equally for either sex, but measures of support relate to illness quite differently for women than for men. Furthermore, Tables 1 and 3 show (for either sex) that the numbers of persons in the cells (the figures in parentheses) are distributed independently; they are divided fairly equally between high and low change at most levels of support rather than clustering in the corner cells, as would be expected if change and support were measuring the same thing. It thus seems appropriate to think of stress and supports as separable dimensions of social susceptibility.

As with most prospective studies that require prolonged compliance, the participants in this study were not systematically sampled from any



defined population. The volunteer panel members tended to be young, healthy, married, well-educated, and of average income. However, participants varied sufficiently in these regards to allow stratification to assess that none of these factors confounded the relationship of stress and support to illness. This relationship was especially pronounced among women with lower income, lower education, or fewer good health practices, as has been reported elsewhere for social supports.<sup>31</sup> The panels included 114 women and 114 men who were married to each other. The pattern of results for these subgroups was the same as that for each panel as a whole, which suggests that the observed sex difference occurs despite a similar environment and is unlikely to be due to sampling bias. Since long-term mortality studies<sup>21,22</sup> have shown similar social risks for both sexes, the gender differences in this study are probably more related to social roles and illness behavior<sup>32</sup> than to risk of major disease.

This study adds prospective, self-reported morbidity data to a growing body of evidence that measures of stress and social supports are associated with a differential risk of sickness. Persons feeling stressed are more likely to experience illness, and among women illness becomes still more likely when social supports are concurrently few. The physician responding to illness in such situations might appropriately offer counsel on coping with stressful change or on diminishing social isolation. The social dimensions of susceptibility deserve increasing attention in clinical practice as well as further scrutiny in research.

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