Job Strain and Health-Related Quality of Life in a National Sample

ABSTRACT

Objectives. Studies of the health effects of job strain have focused on morbidity and mortality as outcomes. This is the first study to examine the relationship of job strain to more comprehensive health status measures that encompass health-related quality of life.

Methods. In a national cross-sectional survey, 1319 working men and women, aged 18 through 64 years, completed a modified version of the Job Content Questionnaire that classified workers' jobs into four categories: high strain, passive, low strain, and active. Subjects also completed the Medical Outcomes Study Short-Form Health Survey and a health distress scale. Logistic regression analyses were employed that controlled for age, race/ethnicity, gender, and education. Both work and nonwork variables were included.

Results. Job strain was significantly associated with five of nine components of health-related quality of life: physical functioning, role functioning related to physical health, vitality, social functioning, and mental health. Job strain made a modest yet statistically significant contribution beyond the effects of chronic illness and psychosocial variables.

Conclusions. The results provide justification for further investigating the role of job strain as an independent risk factor for health-related quality of life. (*Am J Public Health.* 1994;84:1580–1585)

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Introduction

A large literature on job strain[1] and its psychological and physical sequelae[1–11] has made us aware of the significant influence of the psychosocial work environment on health. According to Karasek and Theörell,[1] job strain and its health effects result from the interaction of two factors: (1) a job's psychological "demands" and (2) the degree of "control" or decision latitude a worker may exert over those demands. Control is, in effect, a modifier of a job's psychological demands.

In mostly cross-sectional and/or retrospective studies, "high-strain" jobs (high demand and low control) have been found to be negatively associated with health. Job strain has been associated with cardiovascular disease, left ventricular hypertrophy, and cardiovascular disease risk factors[2–7,11]; retiree mortality[10]; and sleep problems, depression, and psychosomatic symptoms.[8] Hypertension studies have produced conflicting results.[6,9] The "healthier" jobs have been characterized by low demand and high control (i.e., the "low strain" jobs) or high demand and high control (i.e., the "active" jobs). "Passive" jobs (low demand and low control) fall in between the two health extremes.

Our job-strain study goes beyond the usual morbidity or mortality outcomes by assessing the relationship of job strain to indicators of health-related quality of life. We also expand on health-related quality-of-life studies that focused on the influences of illness and medical care while excluding social variables.

Health-related quality-of-life indicators usually encompass a person's ability to function effectively physically, emotionally, and socially and to maintain a sense of well-being.[12–14] The more traditional biomedical health status measures capture the presence, absence, and/or severity of disease or mortality. Although health-related quality-of-life indicators were developed mainly to reflect the consequences of health problems and related treatments,[13] losses in functional capacity or sense of well-being may conceivably precede, follow, or be independent of disease.

We assessed job strain's contribution to health-related quality of life independently of demographic, medical, and other psychosocial variables; many previous studies did not consider other variables that might modify the job strain–health relationship. We also asked whether family and/or workplace supports buffer health differences attributable to job strain.

Methods

Our nationwide health survey was conducted between October 15 and December 22, 1990, by the National Opinion Research Center. Participants were drawn from the Research Center's own 1989 and 1990 General Social Survey samples. For our survey, the Research Center attempted to reinterview 3251 subjects from 2909 General Social Survey households. The resulting sample consisted of 2474 respondents (total response rate = 77%).

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The present analysis was limited to 1319 men and women under 65 years of age who were employed full or part time. Most respondents at least 65 years of age were retired.

Health-Related Quality of Life

Health-related quality of life was measured with the 36-item version of the Medical Outcomes Study Short-Form Health Survey (SF-36).[15] The SF-36 consists of eight subscales measuring aspects of physical, emotional, social, and role functioning; bodily pain; vitality; and general and mental health perceptions. For most items, respondents are asked to evaluate their own health during the past 4 weeks. We also included a health distress scale developed by the same researchers.

The psychometric properties of the SF-36 have been examined extensively and support its validity, reliability, and precision and its advantages over similar instruments in detecting low-level health deficits.[16] It has been shown to distinguish healthy from chronically ill individuals, patients with different types of chronic conditions and degrees of severity, and medically and psychiatrically ill groups.[17–21] The internal-consistency reliability of most of the individual subscales based on the present data was excellent (αs $\geq$ .76–.93). However, the social function subscale, which contains only two items, did not perform as well (α = .62).

SF-36 scores range from 0 (low) to 100 (high). A maximum score of 100 implies the absence of impairment. Results from the Medical Outcomes Study with the 20-item version of the SF-36 indicate that on the general health perceptions, mental health, or bodily pain subscales, a 3-point difference is sufficient to distinguish non-chronically ill persons from those with some form of chronic illness.[18]

In coding missing items on the SF-36 subscale, we followed the scoring method recommended by Ware and colleagues[22]: substituting the respondent's own mean subscale score for the missing item(s). For all other subscales, we used the more conservative approach of replacing a missing item score with the total sample's mean score for that specific item.

Measurement of the Independent Variables

A modified version of the Job Content Questionnaire[23] assessed job demands and control. (The item list can be obtained from the authors.) The Job Content Questionnaire was derived from the 1969, 1972, and 1977 National Quality of Employment Surveys, and recent analyses have begun to confirm its validity and reliability.[1] Cronbach's alpha statistics for the demand and control subscales used in this study were .71 and .76, respectively. One item in the control subscale, "repetitive work," had an item-to-total Pearson correlation coefficient of .21. (α = .81). Principal-components analysis identified three factors. Two were roughly comparable to Karasek's original demand and control subscales. Repetitive work emerged as a third factor, although it contributed more heavily to the control factor. In keeping with Karasek's model, we elected to keep repetitiveness in the control subscale.

We created the four job-strain groups by dividing the distributions of the demand and control dimensions at their respective medians (thereby constructing a high and low group for each dimension) and cross-classifying subjects. Scores located on the demand and/or control medians were classified as "low." Figure 1 shows the resultant four job-strain groups.

We also included the following additional Job Content Questionnaire items:

- A physical demand item.
- Two items measuring support, one each from coworkers and supervisors.
- Single-item measures of perceived job security, skill obsolescence, and future ambiguity (the last three were summed to form an index of job insecurity).

The following additional classes of independent variables were included:

- Demographics.
- Employment status.
- Chronic illness.
- Psychosocial variables (e.g., social supports,[24] life satisfaction).

Descriptive data for these variables are included in Table 1.

Statistical Analysis

We produced descriptive data for the major variables (Table 1), statistical comparisons of health status scores among the job-strain groups (Table 2), and multivariate models depicting the relationship of each of the nine health subscales to the independent variables (Tables 3 and 4). Three dependent variables (vitality, general health perceptions, and mental health) were normally distributed. Consistent with previous studies, the remaining six dependent variables were nonnormal, with the bulk of the responses at 100.[18]

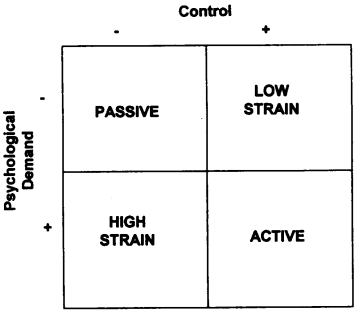

FIGURE 1—Job-strain model.

TABLE 1—Demographic and Psychosocial Characteristics of Study Sample (n = 1319)

Characteristic	Percentage
Female	51.9
White	83.5
Not married	39.7
Full-time job	83.9
Job type	
Manual	22.4
Nonmanual	43.4
Other/sales and service	34.2
No. chronic conditions[a]	
None	34.3
1	25.0
2	19.3
3 or more	21.4
	Mean
Age, y	39.0
Education, y	13.6
General social support (min = 5, max = 25)	18.9
Satisfaction, financial and environmental conditions (min = 4, max = 20)	13.6
Satisfaction, psychosocial conditions (min = 2, max = 10)	7.3
General life satisfaction (min = 1, max = 5)	3.4

Note. Sample includes full-time and part-time employees younger than 65 years of age. No more than 10 responses were missing from any variable.

[a]To create the chronic-condition variable, we combined responses from two questions: whether a doctor had diagnosed any of six specific conditions (yes = 21%) and a self-report of the presence or absence of eight specific conditions and an "other condition" (yes = 61%).

TABLE 2—Mean Health Status Scores, by Job-Strain Group

Health Measures	Job-Strain Groups[a]								Total Sample (n = 1307)		US Norm[b]
	Passive (n = 430)		Low Strain (n = 303)		High Strain (n = 314)		Active (n = 260)				
Physical function[c]	90.0	1.5	92.9	1.5	85.3	2.3	93.0	1.7	90.1	0.9	84.1
Role function/physical[c]	88.8	2.5	90.9	2.6	80.1	3.8	91.7	2.6	87.8	1.5	81.0
Bodily pain[c]	77.0	2.0	81.3	2.2	71.2	2.7	80.8	2.2	77.4	1.2	75.2
General health perceptions[d]	74.4	1.6	79.2	1.8	71.1	2.3	80.2	1.9	75.9	1.0	72.0
Vitality[d]	62.0	1.8	67.6	1.8	54.4	2.5	64.6	2.4	62.0	1.1	60.9
Social function[c]	86.5	1.9	87.6	2.3	79.4	2.6	88.7	2.2	85.5	1.1	83.3
Role function/emotional[c]	84.5	2.8	88.1	2.9	75.6	4.1	86.3	3.4	83.6	1.7	81.3
Mental health[d]	75.5	1.6	79.7	1.7	68.5	2.2	77.2	1.9	75.1	0.9	74.7
Health distress[c]	87.4	1.8	91.0	1.6	81.5	2.7	89.6	2.0	87.3	1.0	85.3

Note. Numbers in columns represent mean and 95% CI (±) with $P < .001$ for all row comparisons.
[a]No more than four responses were missing from any job-strain group.
[b]National norms based on the National Opinion Research Center survey are means weighted to reflect age, sex, and regional distribution of the US population.
[c]Differences tested with Kruskal-Wallis test.
[d]Differences tested with analysis of variance.

Health status differences among the job-strain groups were tested with analysis of variance (ANOVA) for the normally distributed dependent variables. The Kruskal–Wallis test was used for the non-normally distributed health measures (Table 2).

Before final logistic regression analyses were performed, a series of cross-tabulations, correlations, and logistic stepwise regressions were run to clarify the relationships of independent variables within the same conceptual class (e.g., demographic) to the dependent variables. This analysis helped minimize redundancy among conceptually related independent variables. Bivariate correlations (Pearson's Product Moment Correlation) showed total social support to be more strongly related to the dependent variables than either the affective-support or the instrumental-support variable. Marital status did not add significantly to the demographic model but was retained as an independent variable because of its substantive importance. The full set of nonredundant variables was entered into logistic regression models. We culled the statistically significant variables for our final models and identified any variables causing collinearity problems (see Results). Health scores were dichotomized at the median, and we controlled for age, gender, race/ethnicity, and education. Job strain was entered as a four-class dummy variable with the high-strain group always used as the comparison group and coded as zero.

Results are presented in Tables 3 (physical health dimensions) and 4 (emotional health dimensions) as odds ratios and associated significance levels, model chi squares and associated significance levels, and areas under the receiver operating characteristic (ROC) curve. ROC curves plot the relationship between the rate of true-positive classifications to the rate of false-positive classifications.[25] The area under the curve is a goodness-of-fit measure with values above .75 considered acceptable. All models were checked for collinearity problems and none were found.

Results

The demographic characteristics of the sample are described in Table 1.

Work Characteristics

Slightly less than one fourth (23%) of the workers in our sample had high-strain jobs. One third had passive jobs, 24% had low-strain jobs, and one fifth had active jobs.

Almost one fourth (24%) had physically demanding jobs. However, although many described work as psychologically and/or physically demanding, most coworkers (80%) and supervisors (65%) were considered supportive.

Sixteen percent reported job insecurity, and 28% regarded their career prospects as poor. Only 5% predicted their own skill obsolescence.

SF-36 Subscales (Table 2)

Mean SF-36 scores were consistently lowest among workers in the high-strain jobs. The active group and the low-strain group alternated as being the healthiest of the four. The passive group was in the middle.

Health disparities among the job-strain groups were sometimes large. There was a 13.2-point difference in mean vitality scores between the high-strain and low-strain groups and a 12.5-point difference in mean role function/emotional scores (i.e., due to emotional health). All row comparisons with ANOVA or the Kruskal-Wallis test were statistically significant.

Multivariate Results (Tables 3 and 4)

The passive, low-strain, and active job groups each had statistically significant health advantages over the high-strain groups. After the influences of demographics, chronic conditions, and other variables were taken into account, high job strain was significantly associated with lower scores on five subscales: physical function, role function/physical (i.e., due to physical health), vitality, social function, and mental health.

Compared with the high-strain group, the low-strain and passive groups had about 60% to 80% higher odds of experiencing better physical function, role function/physical, social function, and vitality. Vitality levels in the active group also were significantly better than those in the high-strain group. Job strain had its largest impact on mental health; compared with the passive and low-strain groups, the high-strain group had double the odds of poorer mental health.

TABLE 3—Logistic Regression Models: Odds Ratios (95% Confidence Intervals) for Physical Health Dimensions

Independent Variable[a]	Physical Function: High (95–100) vs Low (0–94)	Role Function/ Physical: High (100) vs Low (0–99)	Pain: High (84–100) vs Low (0–83)	General Health Perceptions: High (77–100) vs Low (0–76)	Vitality: High (65–100) vs Low (0–64)
Job strain (9)					
High strain	1.00	1.00			1.00
Passive	1.32 (0.92, 1.88)	1.76 (1.20, 2.58)			1.59 (1.13, 2.25)
Low strain	1.80 (1.19, 2.72) *	1.48 (0.95, 2.30) *			1.62 (1.10, 2.40) *
Active	1.35 (0.89, 2.06)	1.34 (0.84, 2.13)			1.64 (1.09, 2.45)
Workplace support (1)			1.08 (1.01, 1.17)		1.11 (1.03, 1.21)
Strain × workplace support					
Social support (2)	1.04 (1.01, 1.07)	1.06 (1.02, 1.09)	1.04 (1.01, 1.07)		
Strain × social support					
No. chronic conditions (3)	0.53 (0.47, 0.60)	0.48 (0.41, 0.55)	0.50 (0.44, 0.56)	0.60 (0.54, 0.68)	0.70 (0.62, 0.79)
Strain × no. chronic conditions					
Job insecurity (4)				0.91 (0.86, 0.96)	
Strain × job insecurity					
Physical job demands (5)	0.89 (0.79, 0.99)		0.78 (0.70, 0.86)	0.89 (0.81, 0.99)	
Life statisfaction (6)			1.26 (1.09, 1.45)		2.09 (1.77, 2.46)
Satisfaction/material (7)	1.05 (1.01, 1.10)	1.12 (1.07, 1.18)		1.07 (1.02, 1.12)	1.07 (1.02, 1.12)
Satisfaction/social (8)				1.21 (1.11, 1.31)	1.13 (1.03, 1.24)
Married (10)					0.65 (0.49, 0.86)
Manual work (11)					
Nonmanual work (12)					
Full time (13)					
No.	1275	1281	1284	1286	1275
Receiver operating characteristic area	.78	.77	.77	.75	.78
Model chi-square	323.42**	225.54**	304.17**	261.44**	333.29**
df	11	10	9	9	12

Note. Models control for continuous age; gender (male = 1, female = 0); race (White = 1, non-White = 0); and continuous education.

[a]Continuous variables and ranges: (1) workplace support (2 to 10); (2) social support (5 to 25); (3) number of chronic conditions (0 to 3 or more); (4) job insecurity (3 to 15); (5) physical job demands (1 to 5); (6) life satisfaction (1 to 5); (7) satisfaction/material (4 to 20); (8) satisfaction/social (2 to 10). Dichotomous variables: (9) job strain, entered as a set of three dummy variables with high strain as the comparison group; (10) 1 = married, 0 = not married; (11) 1 = manual work, 0 = professional, sales, clerical, service work; (12) 1 = nonmanual work, 0 = manual, sales, clerical, service work; (13) 1 = full time, 0 = part time.

*$.01 < P \leq .05$; **$P \leq .001$.

Social Supports (Tables 3 and 4)

The main effects of workplace support were associated with higher odds of freedom from bodily pain as well as improved vitality, and role function, and emotional health. General social support was associated with five of the subscales. However, none of the strain and support interaction terms, which would have suggested a buffering effect, was significant. In early analyses, the interaction term "workplace support by job strain" had a significant negative association with role function/emotional; the high-strain, low-support group had the lowest scores. However, the interaction term was collinear with the main effect of workplace support and was dropped from the model. Collinearity problems caused by the general "social support by job strain" interaction term in the physical-function model led to its elimination.

Other Variables

Two thirds of the sample reported one or more chronic conditions. The number of chronic conditions reported (up to three or more) was strongly associated with all nine subscales. Each unit increase in the number of chronic conditions decreased the odds of good health by one fourth to one half.

Job insecurity and physically demanding work were associated with poorer health in several models. Life satisfaction had a strong, positive association in five of the eight models (mental health was excluded). People who reported high satisfaction were twice as likely to have good vitality, social function, and role function/emotional.

Satisfaction with environmental and financial circumstances (e.g., housing, standard of living) and satisfaction with family and friends were linked significantly with health in several of the models.

Discussion

Job strain was associated with five components of health-related quality of life: physical functioning, role functioning related to physical health, vitality, social functioning, and mental health. Some health differences, such as those contained in the mental health model, were substantial. In contrast, job strain was associated only marginally with physical functioning ($P \geq .051$).

Although the results support our main hypotheses, we were limited by cross-sectional data. Also, both the SF-36 and job-strain variables were based on self-report. Nevertheless, the SF-36 is associated with a range of objectively and subjectively assessed health measures[13,17,20] and thus should be relatively free of bias.

TABLE 4—Logistic Regression Models: Odds Ratios (95% Confidence Intervals) for Emotional Health Dimensions

Independent Variable[a]	Social Function: High (100) vs Low (0–99)	Role Function/ Emotional: High (100) vs Low (0–99)	Mental Health: High (80–100) vs Low (0–79)	Health Distress: High (95–100) vs Low (0–94)
Job strain (9)				
High strain	1.00		1.00	
Passive	1.81 (1.29, 2.53)		2.25 (1.59, 3.19)	
Low strain	1.68 (1.15, 2.44) *		2.08 (1.40, 3.08) **	
Active	1.32 (0.89, 1.94)		1.53 (1.02, 2.30)	
Workplace support (1)		1.15 (1.06, 1.25)		
Strain × workplace support				
Social support (2)	1.04 (1.01, 1.07)		1.13 (1.09, 1.16)	
Strain × social support				
No. chronic conditions (3)	0.72 (0.64, 0.81)	0.74 (0.65, 0.84)	0.71 (0.62, 0.80)	0.53 (0.47, 0.60)
Strain × no. chronic conditions				
Job insecurity (4)			0.91 (0.85, 0.97)	0.89 (0.84, 0.94)
Strain × job insecurity				
Physical job demands (5)	0.88 (0.80, 0.98)			0.88 (0.79, 0.98)
Life satisfaction	1.83 (1.58, 2.11)	1.94 (1.64, 2.30)		1.44 (1.25, 1.66)
Satisfaction/material (7)				1.08 (1.03, 1.13)
Satisfaction/social (8)		1.12 (1.02, 1.23)	1.38 (1.26, 1.50)	
Married (10)		1.37 (1.03, 1.84)	0.76 (0.58, 1.01)	
Manual work (11)				
Nonmanual work (12)				
Full time (13)				
No.	1282	1275	1277	1286
Receiver operating characteristic area	.75	.76	.78	.76
Model chi-square	255.39**	235.80**	350.07**	286.68**
df	11	8	11	9

Note. Models control for continuous age; gender (male = 1, female = 0); race (White = 1, non-White = 0); and continuous education.

[a]Continuous variables and ranges: (1) workplace support (2 to 10); social support (5 to 25); (3) number of chronic conditions (0 to 3 or more); (4) job insecurity (3 to 15); (5) physical job demands (1 to 5); (6) life satisfaction (1 to 5); (7) satisfaction/material (4 to 20); (8) satisfaction/social (2 to 10). Dichotomous variables: (9) job strain, entered as a set of three dummy variables with high strain as the comparison group; (10) 1 = married, 0 = not married; (11) 1 = manual work, 0 = professional, sales, clerical, service work; (12) 1 = nonmanual work, 0 = manual, sales, clerical, service work; (13) 1 = full time, 0 = part time.

*$.001 < P \leq .01$; **$P \leq .001$.

We were also hindered by the nonparametric distributions of six of the dependent variables, which necessitated a logistic analysis. Thus, we know that job strain is useful in differentiating the "very healthy" from everyone else in the sample. However, we are not able to make more refined comparisons.

We also add an important caveat. The relationships between life satisfaction (i.e., feeling good or bad about one's circumstances) and some of the subscales must be viewed critically because the independent variable may be conceptually overlapping with some dependent variables.

Despite the fact that job strain reached levels of statistical significance in five models, it was sometimes less significant than other variables. We speculate that results may reflect an indirect pathway linking job strain to health-related quality of life. Job strain may operate directly on health-related quality of life by influencing one's perception of functional ability and well-being. However, job strain may also operate on functional ability and sense of well-being indirectly by contributing to the production of physical or mental disease; that is, health-related quality of life is a response to disease or its precursors. Thus, job strain may operate as both a proximal variable, having a relatively direct and immediate influence on health-related quality of life, and as a distal variable operating through the more proximal or mediating influences of stress-induced disease. The latter statement is consistent with the job-strain hypotheses constructed by Karasek, Theörell, and others.[1]

The lack of a significant interaction between job strain and workplace support or general social support indicates that there were no significant buffering effects. The buffering role of workplace support remains controversial,[26] and recent studies have produced results conflicting with our own.[10] Our workplace-support variables may have been too narrowly defined to be statistically significant.

Establishment of job strain as a risk factor for health-related quality of life awaits further study. Studies of the health effects of chronic, long-term exposure to high-strain jobs, in accordance with recent research on Swedish workers by Johnson and Stewart,[27] suggest that it would be potentially fruitful to measure job strain at multiple points in time. In addition, we were unable to assess cumulative strains on worker health by including data pertaining to marital and parenting roles, financial problems, or other factors. However, analyses of the interplay among work, family, and community would strengthen research on both job strain and health-related quality of life.

Our study argues for continued attention to job roles as health risks. Because jobs are socially structured, the additional

risks associated with high-strain jobs should be considered preventable. □

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