THE CHANGING NATURE OF JOB STRESS: RISK AND RESOURCES

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ABSTRACT

The nature of work has changed in the past 30 years but we do not know what these changes have meant for worker job stress. In this chapter we compare data from three surveys of the quality of work life from 1972 to 2002. At the most general level, work today is less stressful than it was in 1972. Workers report fewer job demands, more decision latitude, less job strain, more job security and greater access to job resources and job support. However, these changes have not affected all workers equally. Women, those with less education, non self-employed workers, blue collar workers and workers in manufacturing industries showed the greatest decreases in job stress although levels of job stress remain higher than for comparison groups (men, college educated, white collar, service workers). Changes were not always linear across time suggesting that some aspects of job strain are sensitive to economic cycles.

INTRODUCTION

The nature of work has changed considerably in the past 30 years. But there are conflicting interpretations of what these changes have meant for worker job

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stress. Some argue that work in high performance organizations, for example, is characterized by more stimulating work conducted in a context where workers have considerable say over how the work is done and that this increases decision latitude and reduces job stress (National Research Council, 1999). Other analysts have suggested that the growth in the "service economy" would create vast numbers of low-skill low-paying jobs that feature high levels of job demand and low decision latitude, thus increasing job stress (Braverman, 1974).

Hence, while it is clear that the nature of work has changed, it is not clear whether these changes have increased or decreased job stress among workers. Such an assessment requires comparable data from comparable samples across multiple years. The purpose of this chapter is to provide just such a set of comparisons using data from three surveys of the quality of work life that span 30 years. The data files all utilize representative samples of U.S. workers. These data allow us to document the changing nature of work, the changing nature of workers and changes in job stress and to examine how changes in work and workers have affected changes in job stress.

WORK ORGANIZATION AND JOB STRESS

Job stress is a property of job structures such as the combination of high demands and low decision latitude (Karasek, 1989; Radmacher & Sheridan, 1995). Although it is certainly true that personality and psychological characteristics of workers affect stressful reactions to work conditions, it is employers who largely determine the structure and content of work. In particular, Karasek (1979) has argued that two properties of a job, its level of psychological demands and its level of decision latitude jointly determine the stressful nature of a job. Jobs in which demands are high and decision latitude is low are defined as "high strain" jobs. This demand-control model has become the most prominent model for understanding how job structures affect job stress. Substantial research has been conducted using the model with mixed empirical support (de Lange et al., 2003; Van Der Doef & Maes, 1999). It has also been extended to include the effects that co-worker and supervisor support have on job stress. Workers who receive support from others are less likely to report experiencing job strain. Thus, some researchers refer to the demand-control – support model or the "iso-strain" model (Johnson, 1989; Van Der Doef & Maes, 1999). There are, of course, other models as well. We will investigate the changing nature of job stress using the demand-control model, examining these and other dimensions of work over time. We conceptualize these dimensions in terms of structural "risks" and "resources" that affect the stressful nature of jobs.

Risk, Resources and Stress

The demand-control model or iso-strain models can be contrasted with theoretical approaches that incorporate a broader range of organizational risk factors for stress (Sauter & Murphy, 1995). Findings suggest that not only does support from co-workers and supervisors play a role in determining job stress, but that other job conditions such as job security and access to adequate information and equipment also must be considered.

One way to conceptualize all of these conditions is in the broad context of risks and resources. This perspective has been developed within the Medical Sociology literature as a means for understanding the way in which structural context affects health (Link & Phelan, 1995). Structures both place persons (workers) at risk of illness (stress) and provide access to resources that can be used to avoid stress or to deal with its consequences. It seems clear that the demand-control model falls within this conceptualization. However, the conceptualization also lets us bring in those additional job conditions that are part of a broader explanation for job stress. In this broader model, job conditions that increase the risk of job stress, such as a job with high demands and low decision latitude or one with low job security, can be offset by resources such as co-worker and supervisor support or access to resources with which one can complete work tasks. We use this perspective simply to trace the changing nature of work structures and job stress across data collected in 1972, 1977 and 2002.

THE CHANGING NATURE OF WORK

Since the 1970s the nature of work has changed. Major economic, technological, legal, political and other changes have had a substantial effect on the organization of work in the United States (Sauter et al., 2002). Manufacturing jobs have declined, there is more "knowledge" work, organizations have downsized, there is greater competitive pressure in the marketplace, unionization has decreased and self-employment is reported to have increased. As a consequence of these changes, organizations have implemented practices that change work conditions. Many organizations have adopted flatter management structures and lean production technologies that imply a diffusion of decision-making control (greater decision latitude but, perhaps, also increased job demands). Others argue that changes in the economic environment mean that workers are now less protected from changes in labor and product market forces outside of the organization (Cappelli et al., 1997). Employees are, thus, more vulnerable to job-loss through downsizing, plant closings and use of temporary or contingent workers. According to this argument

stress from job insecurity now occurs throughout economic cycles and not only during recessionary phases.

The occupational structure in the U.S. has also changed significantly and the changes may have implications for the distribution of job stress among occupations. Blue-collar jobs have been lost and service and professional jobs have increased. The National Research Council (1999) suggests that blue-collar jobs now offer workers more autonomy and control and job complexity that might reduce job stress. At the same time, while the number of service jobs has grown, this same report suggests that service jobs have become more routinized and that service workers have lost some control over their work activities. These characteristics are associated with more job stress and, if more workers are employed in service jobs, it would imply an increase in overall job stress.

Job structures also change because of changes in the status of the economy. During recessions, for example, firms follow two adjustment strategies. They lay off workers and they restructure jobs (Hachen, 1992). Generally this restructuring includes higher demands for productivity and closer supervision-factors that increase job stress. Likewise, in expanding economic periods firms hire new workers and monitor work less closely-factors that decrease job stress. While broad shifts in the occupational and industrial distribution of jobs and other long-term technological and global changes affect job conditions, economic cycles that affect corporate profits and employment levels also affect job conditions.

THE CHANGING NATURE OF WORKERS

Between 1972 and 2002 (but not beginning or ending with these years) the demographic characteristics of workers changed dramatically. Women entered the labor force in sizable numbers and many of these women are mothers. The labor force has also aged. In addition, the educational attainment of workers is much higher than in 1972.

These changes may have implications for the structure of jobs (and job-related stress) and the distribution of jobs with stressful content.

CHANGES IN JOB STRESS

To document changes in job stress over the past 30 years we need to assess various indicators of job stress in the context of changes in the nature of work and worker changes that have occurred over this same period. Since the nature of work and the nature of workers have changed so much, we need to describe the distribution of

risks and resources for job stress in terms of these documented changes. We will examine data from three representative samples of American workers collected in 1972, 1977 and 2002.

THE DATA SETS

1972 (Quality of Employment Survey)

A national survey of the quality of employment was conducted in January and February, 1973 by the Survey Research Center of the Institute for Social Research, The University of Michigan. The survey was sponsored by the Employment Standards Administration, U.S. Department of Labor and the National Institute for Occupational Safety and Health, and was intended to provide an overview of working conditions in the American labor force.

There were 1496 respondents. The requirements for respondent eligibility were that they be at least 16 years old and work for pay 20 or more hours per week. People were also interviewed if they worked for pay but were currently not working due to strike, sickness, weather, vacation, or for personal reasons. The sample was, therefore, not representative of the American labor force but was instead a sample of the population of employed workers who met the above sample eligibility requirements. Although households were sampled at a constant rate, designated respondents had variable selection rates according to the number of eligible persons within the household. The data for each respondent are, therefore weighted by the number of eligible persons in the household to make the data representative of all workers.

1977 (Quality of Employment Survey)

This survey was also undertaken in order to provide an overview of working conditions in the American labor force. Like the 1972 survey, this survey utilized a national probability sample of persons 16 years old or older who were working for pay 20 or more hours per week. Although households were sampled at a constant rate, designated respondents had variable selection rates according to the number of eligible persons within a household. Therefore, data for each respondent was weighted by the number of persons in the household.

The 1977 survey was sponsored by the Employee Standards Administration, U.S. Department of Labor. Information was obtained from a sample of 1515 respondents.

2002 (Quality of Work Life)

The Quality of Work Life (QWL) survey was a module of the General Social Survey (GSS) conducted by the National Opinion Research Center (NORC) in 2002. The GSS is a bi-annual representative sample of English-speaking persons 18 years of age and over, living in non-institutional arrangements within the United States. In 2002, a total of 2765 adults were interviewed. The GSS consists of a set of "core" survey items that are asked of all respondents and topical mini-modules of survey items such as the QWL module that are asked of sub-samples of respondents. The QWL module was sponsored by NIOSH. The QWL module was answered by 1777 respondents who indicated that they were employed for pay in the week previous to the survey or temporarily not working because of vacation, illness, etc.

Comparing the Surveys: Methodological Considerations

To compare the survey responses across the different data sets we must first make the characteristics of the samples comparable. The 1972 and 1977 surveys are based on responses from workers 16 years old or older who were working for pay 20 or more hours each week. By contrast, the QWL is based on the responses of workers 18 years old or older and without the requirement to work 20 hours or more. Hence, we specify that, for all data sets, only workers 18 years old or older and who work 20 or more hours per week will be included. These criteria reduce the size of each sample somewhat. In 1972, the weighted number of respondents is 2048, in 1977 the weighted number of respondents is 2226 and, in 2002, the weighted number of respondents is 3010. The data from each survey is weighted by the number of eligible respondents in each interview household to adjust for biases in the selection of household respondents. The weighted data make the samples representative of all eligible workers. In this study, then, the responses we report and the comparison we perform are based on representative samples of American workers who are at least 18 years old and who work 20 or more hours per week.

MEASURES

Each of the surveys contains extensive data on work life. However, in order to compare responses across the surveys, we must limit our analysis to items that are present in all surveys. Indeed, we do not have a separate measure of job stress per se that is available in all three surveys. Rather, we will measure and compare the

components of job stress including risk factors and resources that are components of job stress.

In our analysis we will examine the distribution of these job risks and resources across occupation, industry, union membership and self-employment status to represent the changing nature of work and across gender, marital status, age and education to represent the changing nature of workers.

Job Stress-Risks

According to the demand-control model, job demands and job decision latitude are the components of job strain. In the present analysis, *Job demands* is measured as the sum of three items: The job requires me to work fast; I have enough time to get the job done and I am free from conflicting demands. These items were part of the demand measure developed by Karasek (1979). Scores on this index range between 3 and 12 with higher scores indicating higher demands. Job *decision latitude* is measured as the sum of five items: The job requires that I learn new things; the job allows me to use my skills; I do numerous things on my job; I have a lot of freedom to decide how to do my job; and I have a lot to say in my job. These items were also part of the decision latitude measure used by Karasek (1979). Scores on this index range from 5 to 20, with higher scores indicating greater decision latitude. *Job strain* identifies a situation in which job demands are high and decision latitude is low. High levels of job demands are defined as demand levels above one-half of a standard deviation from the mean and low decision latitude is defined as decision latitude levels below one-half standard deviation from the mean (Karasek & Theorell, 1990). The strain variable is dichotomous; workers who report high demands and low decision latitude are given a score of "1" and all other workers are given a score of "0." Finally, *job security* is measured as a single item: the job security is good. Scores range from 1 to 4 and a higher score indicates greater security.

Job Stress-Resources

While there is continuing discussion about how support and other resources affect the experience of job stress, it is clear that access to supportive co-workers and supervisors and access to needed information and equipment are generally associated with less job stress. In some models, support mediates the effects of job strain on job stress in some it buffers strain while in still others support has an independent effect. In the current analysis, however, we are interested

only in documenting changes in the perception of or availability of resources as characteristics of jobs over time and not in the exact manner in which those resources affect job stress.

Job support is measured as the sum of three items that assess co-worker and supervisor support: my co-workers take a personal interest in me; my supervisor is concerned about my welfare; and my supervisor is helpful in getting my job done. Scores on this index range between 3 and 12, with higher scores indicating greater support. Finally, *job resources* is indexed as the sum of two items: I have enough help and equipment to get the job done; and I have enough information to get the job done. Scores on this index range between 2 and 8, with higher scores indicating greater access to job resources.

The Changing Nature of Work

We measure four characteristics of employment that represent the nature of work. These are, *occupation*, collapsed into two categories, white collar and blue collar; *industry* collapsed into two categories, manufacturing and service; *union membership* (member or not) and, *self-employment status*, (self-employed or employed by others). In the tables that follow, we examine the changing distribution of these work contexts and their relationships with job risks and resources.

The Changing Nature of Workers

Similarly, we measure four characteristics of workers that have changed over the past thirty years and that are related to job conditions, as well. We measure *gender* and we measure *education* as a dichotomous variable; no college and some college or greater. We also measure *marital* status in three categories, never married, not married (divorced separated, widowed) and currently married. Finally, we place workers into one of three *age* groups, 18–34, 35–54 or 55 and over. In the tables that follow, we examine the changing relationship between gender, education, marital status and age group and indicators of job risks and resources over time.

ANALYTIC APPROACH

Our purpose in this study is to document changes in job stress between 1972, 1977 and 2002. As such, our analytic approach will first use analysis of variance (ANOVA) to make comparisons of job stress outcomes across years and between

categories that represent worker and work characteristics. In making these comparisons our objective is to identify important patterns of change, though these may not all be linear. We will not attempt to compare and discuss every job characteristic or worker characteristic mean score with every other relevant mean score. We also make an attempt to explain the variations that are observed using multivariate statistical models that allow us to consider work and worker characteristics simultaneously.

We will first document changes in the nature of workers and work as they are manifest across surveys. Next, we will examine the changes in job stress across years and then we will present and discuss more detailed tables that document changes in job stress across workers and work characteristics across years.

We will then use multivariate analyses to address the question of how all the changes in both the nature of workers and the nature of work have affected observed changes in job stress. This analysis will first explain how the nature of workers and work affect job stress in 1972 and then in 2002. We will then provide an analysis of how changes in these predictors between 1972 and 2002 have affected job stress.

Two general considerations should be held in mind as these tables are reviewed. First, the numbers examined in this study are averages that are derived from representative samples of American workers 18 years old or older who worked 20 hours or more at the time of the interview. Hence, the conclusions we draw may not apply to specific types of workers in specific industries and occupations. They may also be at variance with other findings that are based on studying specific industries or occupations. The advantage of using representative samples of workers is that the results are true of workers-in-general, but the disadvantage is that the results will not be descriptive of specific workers or work conditions. The data collected in each survey are from different workers so we are not documenting individual changes in job stress. Further, the exact nature of what workers do on their jobs has also changed substantially (e.g. the use of computers). We do not document these changes, but, rather, job characteristics that are independent of the exact work conducted.

Second, we use three "data points" and these are not equally spaced over time. That is, our samples represent workers in 1972, 1977 and 2002-gaps of five years and twenty-five years between surveys. This is fortuitous because it prevents us from assuming that changes observed over two points in time (say 1972 and 2002) represent uninterrupted linear change. Moreover, we need to be aware that the data were collected at different points in general economic cycles and that this may have an effect on reported job stress. The American economy was in a different condition at each survey. In 1972, the U.S. economy was at the crest of a sustained and robust economic expansion. In 1977, the economy was just emerging from the most severe recessionary period since the Great Depression and in 2002 the

economy was entering a new recession. Hence, we expect that we will see that not all changes in measured variables are linear and that the broad economic context affects work conditions and job stress as well.

RESULTS

The Changing Nature of Workers and Work

Table 1 documents the changing nature of the American workforce and workplace. The results are in agreement with many previous studies. There has been a linear increase in the percentage of women in the workforce. The percentage increased from 38% in 1972 to almost 50% in 2002. If these women largely entered traditionally "female" jobs, then we might expect an increase in job stress because such jobs tend to be high in job demands and low on decision latitude. On the other hand, there has also been a linear increase in the level of education of workers – those who attended college increased from 36% to almost 61% – that would be related to lower job strain since jobs among educated workers have more decision latitude.

The age composition of the labor force has changed in more complicated ways. There was a slight increase in the proportion of workers 18–24 years old between 1972 and 1977 and then a steep decrease between 1977 and 2002. By contrast, the proportion of workers between 25 and 44 years old decreased slightly between 1972 and 1977 and then increased steeply between 1977 and 2002. There has been a modest increase in the proportion of workers over 45 from 14 to15%. Clearly, the average age of the workforce has increased but most of the observed increase is among workers who were born after 1958 and before 1977 (post-baby boom). The higher average age of workers suggests that job stress may be lower as workers are, on average, more established in their careers or work histories.

The marital status composition of the labor force has also changed substantially. There has been a steady decline in the percent of workers who are married, and increases in the percentages of workers who have never married and who were previously married but are now not married. These changes are partially explained by the general increase in the age of first marriage during this period, the increase in divorce, the increase in female labor force participation and to the decrease in the percentage of younger workers. These patterns would be expected to increase job strain.

In these data self-employment versus working for someone else has not changed. The self-employment rate was 11.7% in 1972 and 12.6% in 2002. The difference is not statistically significant.

Table 1. The Changing Nature of Workers and Work.

	1972	1977	2002	*p*
Worker characteristics				
Gender				
Male	61.9	59.3	50.3	0.000
Female	38.1	40.7	49.7	
Education				
Non-college	63.6	58.7	39.2	0.000
College	36.4	41.3	60.8	
Age				
18–34	46.4	47.3	36.1	0.000
35–54	39.6	38.3	48.9	
55+	14.0	14.4	15.0	
Marital status				
Never married	14.8	19.3	26.1	0.000
Not married	9.5	10.7	17.8	
Married	75.7	70.0	56.1	
Work Characteristics				
Employment type				
Self	11.7	12.1	12.6	0.592 ns
By others	88.3	87.9	87.4	
Occupation				
White collar	52.4	50.9	60.0	0.000
Blue collar	47.6	49.1	40.0	
Industry				
Manfacturing	60.7	59.3	49.5	0.000
Service	39.3	40.7	50.5	
Union member				
Yes	30.0	25.3	15.2	0.000
No	70.0	74.7	84.8	
Weighted *N*	2048	2226	3010	

On the other hand, employment by occupation and industry has changed considerably. Employment in white-collar occupations decreased slightly between 1972 and 1977 but then increased sharply since 1977. The overall pattern of increasing white-collar employment is well known. And employment in white-collar occupations has been found by previous studies to be less stressful. There has also been a linear increase of employment in service industries and a corresponding decrease in manufacturing industry employment. According to previous research

this pattern would be expected to increase over-all job stress. Finally, union membership has declined in a linear fashion, cutting in half the proportion of American workers who are members of unions. Because union jobs are often accompanied by strict rules that affect decision latitude, it may be that the decline in union membership would work to decrease the average levels of job strain.

Changes in Job Stress by Year

Table 2 presents mean changes in the indicators of job stress. Two distinct patterns can be observed in these data. First, job demands declined steadily over the period and decision latitude increased steadily over the period. As a consequence, because of the way it is computed, job strain also declined steadily between 1972 and 2002. This pattern suggests that jobs have become "better" over the past thirty years. Moreover, they have improved because of both decreases in the level of job demands and increases in decision latitude.

The second evident pattern applies to the results related to job security, job resources and job support: levels declined significantly from 1972 to 1977, but rebounded significantly by 2002. Indeed, by 2002 job security and job support were significantly higher than in 1972, while job resources were still significantly lower. These changes generally seem to follow the curves of economic cycles. For example, the measure of job security declined by 0.15 points from 1972 (the crest of an economic cycle) to 1977 (toward the end of the mid-1970s recession), but rebounded by one-quarter point by 2002 (as the economic cycle was just beginning to decline). This pattern suggests that some indicators of job stress are sensitive to macro-economic change while others may be related to technical or other factors.

Table 2. Job Stress Indicators by Year.

	1972	1977	2002	*p*
Job demands	7.25[a]	7.06	6.80	0.000
Decision latitude	14.96	15.16	16.29	0.000
Job strain	0.23	0.17[a]	0.12	0.000
Job security	3.24	3.09	3.35	0.000
Job resources	6.95	6.62	6.80	0.000
Job support	9.25	8.91	9.80	0.000
Weighted *N*	2048	2226	3010	

[a] *p* values for ONEWAY ANOVA.

Table 3. Job Stress Indicators by Year by Gender.

	1972		1977		2002	
	Male	Female	Male	Female	Male	Female
Job demands	7.20	7.32	7.08	7.04	6.80	6.79[a]
Decision latitude	15.27	14.44	15.51	14.60	16.38	16.21[a,b,c]
Job strain	0.19	0.30	0.14	0.22	0.11	0.14[a,b,c]
Job security	3.28	3.18	3.06	3.14	3.34	3.35[a,c]
Job resources	6.92	7.01	6.52	6.77	6.80	6.79[a,b,c]
Job support	9.16	9.40	8.70	9.20	9.69	9.91[a,b]
Weighted *N*	1268	780	1321	905	1514	1496

[a] Mean differences by year are significant.
[b] Mean differences by gender are significant.
[c] Mean differences for interaction are significant.

Job Stress by Year by Gender

In Table 3 we observe changes in job stress by gender. Perhaps the most striking result in this table is the apparent "equalization" of job conditions in terms of job stress for women and men. In 1972 women reported higher levels of job demands, less decision latitude, higher job strain and less job security. In 2002 there are no statistical differences between women and men in terms of job demands, job security and job resources (information and equipment availability) and differences in decision latitude and job strain have narrowed and improved. Since we might have expected that the entry of women into the labor force would increase job stress if women entered traditionally female jobs, we could conclude that women are no longer employed in those jobs and/or that traditional "female jobs" have changed. It should also be noted that women have retained better job support (from co-workers and supervisors) but that their advantage in terms of job resources has disappeared.

Job Stress by Year by Education

Table 4 shows changes in job stress indicators by the education level of workers. Overall and over time, workers who have at least attended college report less job strain. Workers who have been to college reported greater job demands, but also much greater decision latitude and less job strain. In 1972 workers who had attended college reported substantially less job strain and, although this continues to 2002, the gap in job strain with workers with less education is reduced somewhat.

Table 4. Job Stress Indicators by Year by Education

	1972		1977		2002	
	No College	College	No College	College	No College	College
Job demands	7.15	7.42	7.03	7.10	6.53	6.97[a,b,c]
Decision latitude	14.29	16.12	14.51	16.04	15.71	16.67[a,b,c]
Job strain	0.26	0.18	0.20	0.13	0.14	0.11[a,b,c]
Job security	3.21	3.30	3.07	3.12	3.32	3.36[a,b]
Job resources	6.99	6.89	6.66	6.56	6.77	6.81[a]
Job support	9.21	9.34	8.85	9.00	9.69	9.87[a,b]
Weighted *N*	1280	734	1282	901	1172	1815

[a] Mean differences by year are significant.
[b] Mean differences by education are significant.
[c] Mean differences for interaction are significant.

This would appear to be related to both a decrease in job demands and an increase in decision latitude among workers with less than college education. College educated workers report greater job security and there are no differences by education for reported access to job-related resources. College educated workers report greater amounts of job support across the years.

Job Stress by Year by Age

Table 5 shows changes in job stress indicators by age groups. Between 1972 and 2002 job demands for 18–34 year old workers dropped more substantially than

Table 5. Job Stress Indicators by Year by Age.

	1972			1977			2002		
	18–34	35–54	55+	18–34	35–54	55+	18–34	35–54	55+
Job demands	7.15	7.13	6.67	7.08	6.94	7.06	6.94	6.79	6.44[a,b,c]
Decision latitude	14.45	15.43	15.29	14.75	15.68	15.04	15.92	16.44	16.82[a,b,c]
Job strain	0.27	0.19	0.16	0.20	0.15	0.15	0.15	0.11	0.08[a,b,c]
Job security	3.18	3.24	3.44	2.99	3.18	3.20	3.31	3.34	3.48[a,b]
Job resources	6.83	7.03	7.14	6.57	6.63	6.79	6.70	6.81	7.00[a,b]
Job support	9.08	9.41	9.55	8.95	8.85	8.98	9.68	9.79	10.19[a,b,c]
Weighted *N*	950	811	287	1053	852	321	1083	1467	450

[a] Mean differences by year are significant.
[b] Mean differences by age are significant.
[c] Mean differences for interaction are significant.

in any other age group. And, although decision latitude increased for all workers, younger workers have consistently reported the least amount. Hence, job strain is consistently greater among 18–34 year old workers even as the overall proportion of younger workers with high job strain has decreased by almost one-half. Job strain among workers in the 35–54 year old category has declined but not as rapidly as the rate has declined for either younger or older workers.

Job security was lowest among younger workers as would be expected and this has not changed over time. Oldest workers consistently reported the greatest job security as well. Young workers also reported the least access to job resources and the least job support.

The patterns by age group for job stress indicators suggest that entry-level jobs (jobs held by 18–34 year olds) are more stressful than jobs held by older workers. Relatively speaking, these entry levels jobs have become less stressful over time largely because of decreases in the demands made on younger workers and a modest increase in decision latitude. Levels of strain dropped proportionately more for older workers between 1972 and 2002 while also declining substantially for younger workers.

Job Stress by Year by Marital Status

Table 6 shows job stress indicators over time by the marital status of workers. Workers who had never married reported the highest levels of job demand in 1972 but, by 2002 there is no difference between never married workers and other

Table 6. Job Stress Indicators by Year by Marital Status.

	1972			1977			2002		
	Never	Not Married	Married	Never	Not Married	Married	Never	Not Married	Married
Job demands	7.29	7.03	7.27	6.97	7.18	7.07	6.76	6.80	6.81[a]
Decision latitude	13.71	14.65	15.24	14.52	14.94	15.35	15.84	16.07	16.57[a,b,c]
Job strain	0.33	0.25	0.22	0.21	0.22	0.16	0.15	0.15	0.10[a,b]
Job security	3.14	3.08	3.28	3.03	3.04	3.15	3.30	3.33	3.38[a,b]
Job resources	6.90	6.84	6.98	6.76	6.58	6.59	6.71	6.79	6.84[a,c]
Job support	8.86	9.26	9.34	9.33	9.19	8.73	9.73	9.73	9.86[a,c]
Weighted *N*	297	192	1524	422	234	1526	779	533	1675

[a] Mean differences by year are significant.
[b] Mean differences by marital status are significant.
[c] Mean differences for interaction are significant.

workers. Never married workers, however, had the lowest levels of decision latitude at each time. Although never married workers had the highest level of job strain in 1972, by 1977 there was no difference between the levels of strain recorded for unmarried workers. Married workers consistently reflect lower levels of job strain largely because they consistently report greater decision latitude. While some of these results may be related to age (younger workers were less likely to have ever married), age cannot account for this relationship entirely. There is clearly a "never married-not married" penalty that is persistently faced by such workers. Job strain is 50% higher among never married and unmarried workers compared to married workers across the years.

Married workers also consistently reported the highest levels of job security. Job resources and job support do not vary by marital status.

While some of the differences by marital status of workers may be accounted for by age, it is not clear why married workers would report higher decision latitude, but similar levels of job demand compared to not married workers. This may have been related to greater job stability among married workers since they reported the highest levels of job security. If security is related to job tenure, then married workers may have higher levels of decision latitude for this reason.

Job Stress by Year by Employment Type

Table 7 compares the trends in stress indicators for self-employed respondents with respondents who are employees. Job demands have declined for both the

Table 7. Job Stress Indicators by Year by Employment Type.

	1972		1977		2002	
	Self	Other	Self	Other	Self	Other
Job demands	7.16	7.26	7.11	7.05	6.41	6.85[a,b,c]
Decision latitude	17.75	14.58	17.16	14.86	17.66	16.10[a,b,c]
Job strain	0.01	0.26	0.08	0.19	0.02	0.14[a,b,c]
Job security	3.32	3.23	3.20	3.08	3.47	3.33[a,b]
Job resources	7.28	6.91	6.90	6.59	7.12	6.75[a,b]
Job support	Not asked of self-employed					
Weighted *N*	240	1808	270	1956	378	2630

[a] Mean differences by year are significant.
[b] Mean differences by employment type are significant.
[c] Mean differences for interaction are significant.

self-employed and for employees between 1972 and 2002. The self-employed report significantly fewer job demands than employees. Decision latitude followed a curvilinear pattern among the self-employed – declining and then rebounding. However, non-self employed respondents showed a significant linear increase from 1972 to 1977 and from 1977 to 2002. The self-employed reported higher levels of decision latitude in each survey, but the gap declined significantly between 1977 and 2002. Job strain among self-employed persons increased sharply in 1977 because of a decrease in decision latitude. However job strain decreased substantially by 2002. Job strain remained significantly higher for the non-self employed.

Both job security and job resources showed the same curvilinear trends. They declined for both the self employed and others between 1972 and 1977 and then increased for both to 2002. At each time, the self employed reported significantly higher security and resources, and the gaps have not diminished. Job support is not compared because the questions that make up this indicator were not asked of self-employed respondents.

Job Stress by Year by Occupation

Comparisons between white and blue collar respondents are presented in Table 8.

Blue collar workers reported somewhat lower levels of job demands in 1972 than those in white collar jobs. Demands declined substantially for white collar workers from 1972 to 1977 so that they were lower than those in blue collar occupations. However, this trend reversed between 1977 and 2002: job demands declined for

Table 8. Job Stress Indicators by Year by Occupation.

	1972		1977		2002	
	White	Blue	White	Blue	White	Blue
Job demands	7.33	7.16	7.02	7.10	6.92	6.60[a,b,c]
Decision latitude	16.14	13.66	15.93	14.33	16.74	15.65[a,b,c]
Job strain	0.18	0.30	0.14	0.21	0.11	0.15[a,b,c]
Job security	3.33	3.14	3.18	3.00	3.35	3.35[a,b,c]
Job resources	6.97	6.94	6.67	6.57	6.81	6.78[a]
Job support	9.35	9.18	9.19	8.64	9.98	9.55[a,b,c]
Weighted *N*	1053	957	1111	1072	1783	1189

[a] Mean differences by year are significant.
[b] Mean differences by occupation are significant.
[c] Mean differences for interaction are significant.

both groups, but more steeply for blue collar workers, and by 2002 there was a sizeable gap. Indeed, blue collar respondents reported lower levels of job demands in 2002 than in 1972, while white collar respondents reported only slightly lower levels.

Trends in decision latitude and job strain among white and blue collar jobs are different. Decision latitude follows the same curvilinear pattern for white collar workers, declining then increasing, while among blue collar workers the trend was a linear increase. And, although white collar workers continued to have significantly more decision latitude in 2002 (by 1.09 points), the gap was substantially less than in 1972 (2.48) or 1977 (1.6). Trends in job strain, in contrast, have followed a different pattern. Among white collar workers there was a modest but steady linear decline; for blue collar workers, there was a significant decline between 1972 and 1977, but less change afterwards. As a result, however, the gap in job strain between white collar and blue collar workers that was very large in 1972 is now much narrower.

Curvilinear trends are also apparent in job security, resources and support. Security declined for both groups between 1972 and 1977, then increased, with blue collar workers reporting the greatest increase between 1977 and 2002. As a result, by 2002 white and blue collar workers reported the identical level of security. Resources also declined then increased; however, there was no statistical difference between resources levels at any time. Support declined then increased, but white collar workers always enjoyed higher levels of support and this gap increased, especially between 1972 and 1977.

Job Stress by Year by Industry

Table 9 presents comparisons in job stress levels and trends by industry: manufacturing versus service. Given the occupational make up of these industrial categories (concentration of blue collar job in manufacturing and white collar in service) we would expect the results in Table 9 to be similar to those in Table 8. And, overall, that is what we observe. Trends in job stress measures have generally followed curvilinear patterns (except job demands, decision latitude and job strain), while jobs in service industries, for the most part, have remained less stressful.

Job demands declined among both manufacturing and service industry workers between 1972 and 2002. They declined relatively faster among jobs in manufacturing industries so that in 2002 the job demand level was actually lower than in service industries. However, job demands do not differ statistically between manufacturing and service industries. Decision latitude increased in manufacturing jobs between 1972 and 1977 and between 1977 and 2002. Among

Table 9. Job Stress Indicators by Year by Industry.

	1972		1977		2002	
	Manuf.	Service	Manuf.	Service	Manuf.	Service
Job demands	7.28	7.19	7.14	6.94	6.75	6.85[a,c]
Decision latitude	14.31	15.92	14.62	15.90	15.86	16.73[a,b,c]
Job strain	0.27	0.18	0.21	0.13	0.14	0.10[a,b,c]
Job security	3.18	3.35	3.02	3.20	3.32	3.39[a,b]
Job resources	6.96	6.96	6.58	6.68	6.77	6.82[a]
Job support	9.14	9.50	8.69	9.23	9.73	9.87[a,b,c]
Weighted *N*	1209	782	1317	905	1475	1503

[a] Mean differences by year are significant.
[b] Mean differences by industry are significant.
[c] Mean differences for interaction are significant.

service industry jobs, there was no significant change between 1972 and 1977, but a significant increase between 1977 and 2002, but the increase was not as great as in manufacturing. In 1972, respondents in manufacturing jobs reported significantly greater levels of job strain (0.27) compared to those in service jobs (0.18), and while strain decreased significantly for both groups by 2002, the decline was greater for those in manufacturing (down to 0.14, versus 0.10 for service).

Job security, resources and support declined in both industries between 1972 and 1977, and then increased through 2002. In all three years, workers in service industries had significantly higher levels of security. They also had significantly higher levels of support in 1972 and 1977, but that gap narrowed by 2002. There were no significant differences by industry in level of resources in any of the three surveys.

Job Stress by Year by Union Membership

Changes in job stress for union members and non-union respondents are compared in Table 10. Job demands were slightly lower for union members in 1972 but became higher than among non-union employees in 1977 and 2002. Job demands declined faster among non-union members than among union members. Decision latitude increased between 1972 and 1977 and again between 1977 and 2002 for both union members and non-members. In both 1972 and 1977, non-union respondents reported significantly more decision latitude (1.07 and 0.91 scale points, respectively), but this difference narrowed substantially by 2002 (0.19). Job strain declined for both groups, especially between 1972 and 1977, but the

Table 10. Job Stress Indicators by Year by Union Membership.

	1972		1977		2002	
	Union	Non-Union	Union	Non-Union	Union	Non-Union
Job demands	7.20	7.27	7.13	7.04	6.94	6.73[a]
Decision latitude	14.21	15.28	14.46	15.37	16.12	16.31[a,b,c]
Job strain	0.28	0.22	0.23	0.16	0.14	0.12[a,b]
Job security	3.30	3.22	3.09	3.09	3.51	3.33[a,b,c]
Job resources	6.89	6.98	6.34	6.72	6.71	6.80[a,b,c]
Job support	8.94	9.42	8.39	9.16	9.50	9.87[a,b]
Weighted *N*	602	1408	552	1630	302	1681

[a] Mean differences by year are significant.
[b] Mean differences by union membership are significant.
[c] Mean differences for interaction are significant.

level of strain has remained higher for union members. In 2002 the difference in job strain between union and non-union members is not significant.

Again, we observe general curvilinear trends in job security, resources and support among both union members and non-members: decline and then increase. However, the decline and subsequent increase in security and resources was much greater among union members. In 1972, union members reported greater job security than non-members, but by 1977 there was no difference. However, by 2002, union members again reported greater security than non-members, although both reported more security than in 1972. Indeed the gap was greater in 2002 than in 1972. Union members reported having fewer job resources in 1972 (−0.09) and the gap increased significantly in 1977 (−38). Although this resource gap remained through 2002, it narrowed to what had been reported in 1972. For neither group, however, were reported resources as great as in 1972. Non-union respondents reported significantly higher levels of job support than union members in each of the three surveys, and both groups reported higher levels of support in 2002 than in 1972.

Part Time vs. Fulltime Workers – 2002

There is one more change in the labor market that may be relevant to determining levels of worker job stress. Over the thirty years of these surveys the number of part time employees has increased substantially and some researchers have suggested that part time jobs are more stressful (Tilly, 1991). In the 2002 GSS Quality of Work Life survey we have data for workers who are employed less that 20 hours

Table 11. Job Stress Indicators by Part-Time, Full-Time Status in 2002.

	Parttime	Fulltime	*p*
Job demands	5.89	6.83	0.000
Decision latitude	15.66	16.33	0.000
Job strain	0.07	0.13	0.004
Job security	3.38	3.35	0.512 N. S.
Job resources	7.10	6.80	0.000
Job support	10.16	9.78	0.003
Weighted *N*	334	2887	

Note: *p* values for ONEWAY ANOVA. Part-time = LESS THAN 20 HOURS/WEEK.

per week. While we cannot make comparisons with previous surveys because they did not collect data on part time workers, we can compare part time and full time workers in 2002.

Table 11 shows job stress indicators for part time and full time workers. The table shows that part time workers had significantly fewer job demands and significantly less decision latitude than full time workers. As a consequence part time workers reported only one-half as much job strain as full time workers. Part time workers also reported higher levels of job resources and job support and no differences in perceptions of job security. These results are somewhat at variance with discussions of the nature of part time work (Tilly, 1996). They suggest that part time work is not uniformly associated with poor working conditions. Although it was not our objective to examine part time employment, it is clear that a more complete contemporary picture of the distribution of job stress must account for the experiences of part time workers.

Multivariate Analyses of Job Stress, 1972 and 2002

In this section we will develop and examine multivariate causal models that predict job stress outcomes from the combination of all worker and work characteristics that have previously been examined individually. By combining all eight of these characteristics into ordinary least square (OLS) regression equations we will be able to determine the relative predictive strengths for each of the six stress outcomes at any given time. We will then use the results of these equations to account for changes in the levels of the job stress outcomes between 1972 and 2002 by using the procedure of "regression standardization" (or "regression decomposition"). The results of these change analyses, along with the explanation of the procedures for obtaining them, will be presented in the following section.

Because of the complexity of the analyses that follow we have made two changes from the previous analyses. First, we analyzed OLS regression equations for 1972 and 2002, only. Second, we combined the age categories of "35–54" and "55+" into a single category of "35+," and combined the marital status categories of "never married" and "not married" into a single "not married" category. We did so in order that all independent variables would be measured in the same "zero-one" format, reflecting the absence (zero) or presence (one) of the particular characteristic. We coded "one" those characteristics which historically have indicated the more "advantaged" statuses: male, older (35+ years of age), college (13+ years of education), married, self-employed, white collar, service industry and union member. Coding all independent variables in the same zero-one format simplifies the interpretation and comparison of the metric (unstandardized) regression coefficients. Each coefficient measures the effect of a respondent being in the more advantaged category versus the less advantaged category; and because all independent variables are comparably measured, their coefficients become directly comparable: those variables with the larger coefficients have the greater effects on job stress outcomes. We retained the previous coding of these job stress measures.[1]

Results for the OLS regression analyses of 1972 job stress outcomes are presented in Table 12. The overall ability of these equations to predict job stress outcomes is indicated by the percentage of explained variance in the outcomes – the *R*-squares. While these *R*-squares indicate that the equations explain significant percentages of variance in each of the stress outcomes, the percentages range widely from almost a quarter (0.237) of the variance in decision latitude to just over 1% (0.014) in job resources. In the first equation just over 2% of the variance in job demands is accounted for by the eight worker and job characteristics. Three of these characteristics have significant effects: older workers (35 years and older) and those employed in service industries had significantly fewer demands that did younger workers and those in manufacturing industries, respectively. In contrast, those with more education (college) had significantly more demands.

The measured variables are best at predicting decision latitude in 1972. In addition to explaining almost a quarter of the variance in decision latitude, each characteristic had a significant effect on the level. In 1972, decision latitude was greater among males, older workers, those with higher education, and married workers. The greatest effect was for self-employed workers, followed by white collar workers and those in service industries, all of whom had significantly greater decision latitude than the contrasting categories. Union members had significantly lower decision latitude than those not in unions.

Since job strain is a composite variable of job demands and decision latitude it is not surprising that it is predicted by many of the same characteristics that

Table 12. Ordinary Least Squares Regressions of Job Stress Variables by Characteristics of Workers and Jobs, 1972.

	Job Demands	Decision Latitude	Job Strain	Job Security	Job Resources	Job Support
Male	0.174[a]	0.929***	−0.114***	0.118***	−0.137*	−0.190
	(0.090)	(0.152)	(0.025)	(0.046)	(0.059)	(0.103)
Age (35+)	−0.463***	0.630***	−0.091***	0.074	0.173**	0.323***
	(0.085)	(0.143)	(0.019)	(0.044)	(0.056)	(0.096)
College	0.208*	0.809***	−0.027	−0.010	−0.061	0.111
	(0.097)	(0.162)	(0.021)	(0.050)	(0.063)	(0.110)
Married	0.179	0.709***	−0.029	0.112*	0.084	0.320**
	(0.098)	(0.162)	(0.022)	(0.050)	(0.064)	(0.111)
Self-employed	−0.007	2.363***	−0.185***	0.035	0.300***	−0.172
	(0.132)	(0.223)	(0.029)	(0.068)	(0.087)	(0.150)
White collar	0.142	1.650***	−0.082***	0.171***	−0.013	−0.089
	(0.094)	(0.158)	(0.021)	(0.048)	(0.062)	(0.107)
Service industry	−0.209*	1.052***	−0.086***	0.155***	−0.004	0.232*
	(0.093)	(0.152)	(0.020)	(0.048)	(0.061)	(0.105)
Union	−0.024	−0.436**	0.029	0.108*	−0.062	−0.451***
	(0.092)	(0.155)	(0.020)	(0.047)	(0.060)	(0.105)
Intercept	7.409***	11.801***	0.473***	2.854***	6.895***	9.026***
	(0.116)	(0.195)	(0.025)	(0.059)	(0.076)	(0.132)
R^2	021***	0.237***	0.085***	0.023***	0.014***	0.020***

[a] Metric coefficients (standard errors in parenthesis).
*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

predicted its components. Specifically, 1972 job strain was lower for males, older workers, married workers, the self-employed, white collar workers, and those in service industries.

Among the three remaining job stress outcomes, 1972 job security was greater among males and married workers as well as those in white collar jobs and those in service industries. Women enjoyed more job resources than men, as did older workers and the self-employed. Job support was greater among older and married workers and those working in service industries, but was less among union members.

Of all the worker and job characteristics used in these regression equations, age and being employed in service industries were the most predictive of job stress outcomes in 1972. Each significantly affected job stress in five of the six equations, with older workers and service workers having less stress. Gender had significant effects in four equations, with males having lower levels of job stress in three (decision latitude, job strain and job security) and females having lower levels in one (job resources).

Table 13 presents the regression results for job stress outcomes in 2002. As with 1972, the eight worker and job characteristics combine to account for significant percentages of explained variance in each of the stress outcomes

Table 13. Ordinary Least Squares Regressions of Job Stress Variables by Characteristics of Workers and Jobs, 2002.

	Job Demands	Decision Latitude	Job Strain	Job Security	Job Resources	Job Support
Male	0.068[a]	0.446***	−0.050***	−0.013	0.009	−0.123
	(0.070)	(0.092)	(0.012)	(0.033)	(0.048)	(0.079)
Age (35+)	−0.239***	0.260**	−0.027*	0.038	0.103*	0.139
	(0.072)	(0.096)	(0.013)	(0.034)	(0.049)	(0.081)
College	0.366***	0.488***	−0.001	0.019	0.016	0.050
	(0.074)	(0.098)	(0.013)	(0.035)	(0.050)	(0.053)
Married	0.085	0.389***	−0.031*	0.046	0.050	0.074
	(0.069)	(0.092)	(0.012)	(0.033)	(0.047)	(0.078)
Self-employed	−0.383***	1.379***	−0.109***	0.135**	0.331***	0.104
	(0.102)	(0.135)	(0.018)	(0.048)	(0.070)	(0.115)
White collar	0.232**	0.854***	−0.039*	−0.011	0.013	0.331***
	(0.075)	(0.100)	(0.013)	(0.035)	(0.051)	(0.085)
Service industry	−0.019	0.609***	−0.038*	0.059	0.035	0.020
	(0.071)	(0.095)	(0.013)	(0.035)	(0.049)	(0.081)
Union	0.188	−0.026	0.005	0.059	−0.056	−0.299*
	(0.155)	(0.152)	(0.021)	(0.035)	(0.078)	(0.130)
Intercept	6.537***	14.398***	0.240***	0.179***	6.630***	9.525***
	(0.093)	(0.123)	(0.017)	(0.054)	(0.064)	(0.105)
R^2	0.024***	0.120***	0.028***	0.007***	0.010***	0.012***

[a] Metric coefficients (standard errors in parenthesis).

*$p < 0.05$.

**$p < 0.01$.

***$p < 0.001$.

(*R*-squares). However, in four of the six outcomes the amount of explained variance is dramatically smaller than in 1972: decision latitude, job strain job security and job support. These characteristics do explain slightly more variance in job demands in 2002 than 1972 (0.024 versus 0.021), as shown in the first equation. Also similar to 1972, job demands in 2002 declined with age and increased with education. However, unlike 1972, 2002 job demands were significantly lower among self-employed and white collar workers, while working in service industries made no difference.

Worker and job characteristics were best at explaining variance in decision latitude in 2002, as they were 1972, but the *R*-square was just half that in 1972 (0.120 versus 0.237). All characteristics were again significant predictors of the level of decision latitude in 2002, with the exception of union membership. Decision latitude was greater among males, older, more educated, and married workers, the self-employed, white collar and service industry workers. Conversely, job strain was significantly lower among the same groups, except those with more education (where there was no difference). Together, these characteristics explained just under 3% of the variance in job strain, down from 8.5% in 1972.

The other three job stress outcomes were less well predicted by these characteristics, ranging from 0.7% for job security to 1% for job resources and 1.2% for job support. Job security was greater for the self-employed and for union members. Self-employed workers also had more job resources in 2002, as did older workers. Job support was greater among white collar workers but lower among union members.

Of all characteristics, self-employment was the most important predictor of stress outcomes in 2002: in five of the six equations, self-employed workers had significantly lower levels of job stress. Age continued to be important, with older workers having lower stress in four equations. However, gender and employment in services industries became less important in 2002 than in 1972. Males lost their advantage in job security, while females lost their advantage in job resources. Service industry workers lost their advantages in job demands, job security and job support. In contrast, differences between blue and white collar workers became greater in 2002: white collar workers had more job demands in 2002, but also greater job security and support. Thus, it appears that there has been a shift in an important determinant of job stress – from differences based on service versus manufacturing industry employment in 1972 to differences based on white versus blue collar employment in 2002.

Moreover, there appears to have been a diminishing of the differences in stress outcomes between more and less advantaged groups of workers over this thirty year period. This trend is suggested by the relative sizes of the regression coefficients in 1972 and 2002. Of the forty-eight regression coefficients shown in Table 12 (1972)

and 13 (2002), thirty-six are smaller in 2002 than in 1972. Since these coefficients measure the effects of being in the historically more advantaged categories (coded one) versus less advantaged categories (coded zero) for each characteristic, their diminishing sizes indicate lessening of the gaps between these categories. We explore these changes below in developing an analysis that explicitly accounts for changes in job stress between 1972 and 2002.

Accounting for Changes in Job Stress, 1972–2002

Accounting for changes in job stress requires a procedure that allows for the measured differences in job stress outcomes in 1972 and 2002 to be divided up into components that can be attributed to the various worker and job characteristics. The most widely accepted procedure for decomposing differences in outcomes between two groups or two points in time is through the use of regression standardization (Althauser & Wigler, 1972; Duncan, 1969). While this procedure has primarily been used by economists and sociologists to account for differences in earnings between groups, such as blacks and whites or men and women (Duncan, 1969; Iams & Thornton, 1975), it easily adapts to accounting for differences over time in non-panel longitudinal studies, such as the current study (time 1 is one group; time 2 is a second group) and to any studied outcome, including stress.

In the following analysis, we use regression standardization to decompose the measured differences in the six stress outcomes between 1972 and 2002 into four components. First, we can determine the amount of differences that were due to changes in the composition of worker and job characteristics between 1972 and 2002, for example, the amount of change in a stress outcome that was due to the increasing percentage of college educated workers and/or white collar jobs. Second, we can determine the amount of differences that were due to changes in the sizes of the regression coefficients, or slopes, that measure the rates of difference between the zero and one categories for each of the worker and job characteristics. This assesses the degree to which the overall stress outcome is due to the categories becoming more or less similar in their effects – convergence or divergence. Third, there is an "interaction component" that accounts for the amount of change due to simultaneous changes in composition and changes in regression slopes, or rates. The final component accounts for the amount of change due to changes in the intercept of the regression equation. When added together, the subtotals of differences for these four components are equal (within rounding error) to the mean differences in stress outcomes, as calculated by subtracting the mean of the outcome in 1972 from the mean in 2002.

The formula used here for decomposing differences in job stress outcomes between 1972 and 2002 that were presented in Tables 12 and 13 is:

$$\bar{Y}_{(02)} - \bar{Y}_{(72)} = (a_{(02)} - a_{(72)}) + \sum b_{(72)}(\bar{X}_{(02)} - \bar{X}_{(72)}) + \sum \bar{X}_{(72)}(b_{(02)} - b_{(72)}) + \sum (\bar{X}_{(02)} - \bar{X}_{(72)})(b_{(02)} - b_{(72)}).$$

$\bar{Y}_{(02)} - \bar{Y}_{(72)}$ is equal to the computed mean differences in a specified stress outcome between 2002 and 1972 (as presented in Table 2). This mean difference is decomposed into the four components on the right side of the equation: (1) $(a_{(02)} - a_{(72)})$ equals the difference in the stress outcome due to the difference in intercepts; (2) $\Sigma\, b_{(72)}\, (\bar{X}_{(02)} - \bar{X}_{(72)})$ is the composition component, the amount of difference in the stress outcome which is due to differences in the means of the independent variables. This represents the amount of change that is due to changing compositions of worker and job characteristics, such as the increasing percentages of women, highly educated workers and those in white collar jobs. (3) $\Sigma\, \bar{X}_{(72)}\, (b_{(02)} - b_{(72)})$ equals the amount of difference in job stress which is due to differences in the slopes of the regression coefficients. This represents the amount of change that is due to increasing or decreasing regression effects, or in this analysis the rates of differences between the zero (disadvantaged characteristics) and one (advantaged characteristics) categories for each independent variable. (4) $\Sigma\, (\bar{X}_{(02)} - \bar{X}_{(72)})\, (b_{(02)} - b_{(72)})$ is an interaction term, interpreted as the joint effects of changes in variable means and regression slopes. This formula is calculated separately for each job stress outcome.

Table 14 presents a summary of the results of this regression standardization procedure for each of the six job stress outcomes.[2] The table presents, in the columns from left to right, the mean difference for each outcome between 2002 and 1972, the difference between the regression equation intercept in 2002 and that in 1972, the difference due to changing compositions of worker and job characteristics, the difference due to changing rates between categories of worker and job characteristics, and the change due to the interaction between changing compositions and changing rates. The last three columns are sums of the composition, rate, and interaction differences computed individually for each of the eight worker and job characteristics for each of the stress outcomes.

The mean changes in the far left column of Table 14 are the differences in means in stress outcomes between 1972 and 2002 (as also presented in Table 2). Recalling the discussion of Table 2, all mean changes were significant, and all but the decrease in job resources represents changes toward less stressful job characteristics. From examining the four right hand columns of Table 14 it is clear that by far the largest contributions to the mean changes in stress outcomes are from the changes in

Table 14. Decomposition of Differences in Job Stress Variables Between 1972 and 2002.

	Differences Accounted for by Changes in				
	Mean Change (2002–1972)	Intercepts (2002–1972)	Composition Rates (2002–1972)	Interaction (2002–1972)	Regression Between Slopes Composition and Rate Change
Job demands	−0.449[a]	−0.872	−0.020	0.398	0.051
Decision latitude	1.221	2.597	0.350	−1.422	−0.149
Job strain	−0.108	−0.233	−0.025	0.124	0.029
Job security	0.110	0.371	0.012	−0.227	−0.018
Job resources	−0.155	−0.265	0.013	0.089	0.005
Job support	0.547	0.499	0.104	−0.051	−0.019

[a] Discrepancies between Mean changes in the first column and the sum of the Differences columns are due to rounding errors.

intercepts and changes in regression slopes. With the exception of job support, changes in the composition of work and jobs make only trivial contributions to the mean changes, as do the contributions of the interaction component.

Intercept changes are the largest changes found in Table 14, and again with the exception of job support, differences in the intercepts are much larger than the differences in means – from 1.7 to 3.7 times as large. And these changes are in the same direction as the mean change of the job stress outcome. Changes in intercepts reflect the amount of changes among those workers who were coded "zero" on all independent variables: i.e. females, younger, less educated, not married, blue collar, manufacturing, non-union workers who were not self employed; that is, the least advantage workers. In other words, the rates of change among the least advantage workers were from 1.7 to 3.7 greater than the rates of change among workers as a whole. With the exception of job resources, these were changes in the direction of less stressful job characteristics.

Conversely, the amount of change due to changing rates, or regression slopes, is the summation of changes in the regression slopes of each independent variable in the equation. This number reflects the amount in change among workers coded "one" on all independent variables (e.g. male, older, college educated, married, white collar, service, union, and self-employed) – *relative to the changes in the intercept*. While changes in intercepts measure changes among the least advantaged workers, changes in regression slopes measure changes among the most advantage workers. That the directions of rate changes are always in the opposite direction of intercept changes and changes in overall means indicates there has been

relatively less change in stress outcomes among the most advantaged workers. However, because the absolute values of the rate changes are smaller than those for intercept changes, changes for both more and less advantaged workers are in the same direction. This again points toward a convergence between more and less advantaged workers toward overall less stressful job characteristics.

Among specific independent variables, rate changes by gender and age contribute the most consistently to the overall rate changes, followed by changing rates between blue and white collar occupations. For job demands, gender (0.150) and age (0.120) contribute over half the overall rate change (0.398). For decision latitude, occupational rate change – white collar versus blue collar – contributes almost as much (−0.415) as the combination of gender (−0.299) and age (−0.199). Together, the three contribute over half of the overall rate change (−1.415). Gender (0.040) and age (0.034) again contribute over half of the total rate change in job strain (0.089). Gender (−0.081) and occupation (−0.083) contributed over half of the total rate change for job security, while one of the few instances of divergence-here between male and female (−0.090) – accounted for all the rate change in job resources (0.089). The other variables contribute only small rate changes in opposite directions. For job support, converging rates between married and not married workers contributes substantially (−0.186) to overall rate change, but this is more than offset by another case of increasing divergence, in this case between blue and white collar workers (0.219). As a result, job support is the only stress outcome in which composition change (0.104) is greater than rate change (−0.051). (Results not shown; they are available upon request.)

Although overall changes in the composition of worker and job characteristics contributed only trivial amounts to changes in stress between 1972 and 2002, there were a few specific contributions that were substantial, in particular for increasing decision latitude: these are the increase number of workers with higher levels of education (13+ years), which contributed over half of the total composition change (0.197), followed by the increasing number of white collar workers (0.132) and workers in service industries (0.118).

Likewise, only a few specific interaction changes provided substantial contributions. The interactions between composition and rate changes for gender and age made large contributions to overall mean changes for job demands (0.142 and 0.116, respectively) and decision latitude (−0.465 and −0.174, respectively). Indeed the contribution of the gender interaction for decision latitude is the single largest contribution of any component to the overall mean change, while its interaction component is almost as large as its rate component in accounting for mean change for job demand. These interaction components for age also contribute almost as much as their rate components to mean changes for job demands and decision latitude. The interpretation

of interaction components in regression standardization is that they represent the amount of change due to the dependence of rate changes on changes in composition (Duncan, 1969; Iams & Thornton, 1975). Substantively, this means that a substantial part of gender rate convergence in job demands and decision latitude was dependent upon the increasing proportion of women in the labor force, while the increasingly similar levels of job demand and decision latitude between younger and older workers was in part due to the increasing number of older workers.

SUMMARY

During the last thirty years, what people do at work, how they do it, and who does it have changed significantly. It is difficult, therefore, to make many comparative statements about how all these changes have affected workers' job stress. Yet it is possible to track changing characteristics of workers and jobs over time. The demand-control model and the broader risk and resources model of job stress assess job-related conditions that can be measured regardless of the specific content of one's job or how that job may have changed.

In this study we were able to draw on three separate surveys of representative samples of U.S. workers conducted in 1972, 1977 and 2002 to track these changes and we set these changes in the context of the changing nature of workers, work and the economy.

Are jobs more or less stressful in 2002 than they were in the1970s? At first glance the answer appears to be that they are less stressful. However, the precise meaning of this conclusion and its relevance for judging the way that changes in workers and the workplace have affected worker stress are not always clear. In 2002 workers reported more decision latitude in their jobs and less job strain than in 1972 or in 1977. Generally job demands dropped between 1972 and 2002 also. Changes in job security, job resources and job (co-worker and supervisor) support followed a curvilinear pattern of decline between 1972 and 1977 and an increase between 1977 and 2002. These non-linear changes in job stress indicators suggest that the observed changes are not solely a result of a progressive effort by employers to make work better. Economic cycles, changes in worker characteristics and changes in the industrial and occupational distribution of jobs all affect overall levels of job stress.

The pattern of change that was observed between 1972 and 1977 indicates that job conditions related to worker stress are sensitive to cyclic economic changes, such as the severe recession of 1974–1975. The curvilinear effect that we observed in these data tells us that jobs get restructured with regard to conditions that affect

job stress and that levels of job security are also affected by cyclical economic conditions.

We also found that exposure to job stress varies by worker characteristics. Women entered the labor force in significant numbers during this 30 year period. Women now (2002) experience lower levels of job demands and higher decision latitude in their work compared to 1972, and their current levels of job strain are nearly identical to those of male workers. Clearly the quality of work conditions has improved for women.

College education remains an advantage in terms of exposure to stressful work conditions, although the level of job strain for non-college educated workers has also declined. Since many more workers have at least some college education compared to 1972, it is clear that a larger proportion of the labor force works under lower stress.

Changes in the age composition of the work force have also affected the experience of job stress. In 2002, younger workers reported relatively high levels of job stress compared to other age groups. However, the levels of job stress have declined substantially from 1972 and are nearly equal to those found among 25–44 year olds. And, although the proportions of the labor force who are either never married or not currently married has increased substantially, married workers have continued to have less stressful jobs.

Self-employed individuals are much less likely to report job strain mostly because they have considerable decision latitude in their work. Indeed they report more job security and better job resources than employees as well.

Changes in the nature of the industrial and occupational distribution of jobs have also affected job stress. There has been a large shift from blue to white collar employment and from manufacturing to service industries over the last thirty years. White collar jobs have continued to be less stressful, as has service work. Hence, part of the explanation for any decline in job stress has been due to these shifts in occupational and industrial distributions of jobs. The differences in job stress between union and non-union workers have remained, but both reported less stress in 2002 than in 1972. Finally we presented some limited data which show that part-time employees (a much higher percent of all workers in 2002) are exposed to more stressful job conditions.

The nature of work vis-à-vis its stressful characteristics has changed but the changes are uneven. The changes we observed here are complex functions of changes in the economy, the nature of workers and of the types of work.

To sort out the effects of these changes we used multivariate analytic techniques to examine differences in the way that worker and job characteristics explain job stress in 1972 and in 2002 and we then assessed how changes in worker and job characteristics between 1972 and 2002 accounted for the differences we observed.

Perhaps the most interesting result of these analyses was the discovery that worker and work characteristics that were considered disadvantageous in 1972 (i.e. female, low education, younger, blue collar, manufacturing and, non-union member) are less disadvantageous today (i.e. in 2002). There has been an overall trend toward less stressful work since the 1970s, and, the pace of this trend has been more rapid among those workers and jobs that had the highest levels of stress in the 1970s.

These conclusions are at odds with some of the literature on the changing nature of work in the United States since the 1970s (Cappelli et al., 1997; Tilly, 1996). A major theme of that literature has been the disappearance of "good" jobs and the proliferation of "bad" jobs. However, the "good" and "bad" nature of these jobs are mostly characterized by their extrinsic properties, especially earnings, fringe benefits, the full time versus contingent nature of the employment contract, and the presence or absence of career ladders. The analyses and conclusions developed in this chapter are concerned rather with the intrinsic work characteristic of job stress.

It should also be reiterated that changes in job stress could be the partial consequences of cyclical changes in markets as well as changes in technology, globalization, or managerial philosophy. That is what the data from the 1977 QES suggests. Thus, the observed changes may also be explained by the particular points in economic cycles during which the 1972 and 2002 data were obtained. Regardless of the extent to which the documented trends in this chapter are linear or cyclical, 2002 is not the end point in workplace trends so observations in future years would be well-justified.

Finally, while many of the job "risks" that are related to stress – such as job demands and job strain have declined, so have job "resources." Moreover, there has been increasing divergence of these resources, with the least advantaged workers and jobs losing resources at a faster pace than the more advantaged. This is consistent with the theme in the literature on workplace change that management is increasingly making workers responsible for doing their jobs, while withdrawing organizational resources (Cappelli et al., 1997). This is what is often referred to as "lean production," or "doing more with less." The question is, if this trend toward lower and diverging job resources continues, will it reverse the other trend toward decreasing and converging risk of stress?

NOTES

1. While job strain is a 0–1 dependent variable, and thus logistic regression is the appropriate method of analysis, logistic regression coefficients do not work for decomposition, and we found that there are no differences between the regression

coefficients that are significant in OLS and those that are significant in logistic regression analysis.

2. The sums of these columns are, within rounding error, equal to the mean differences. We are presenting only the summary results rather than the decomposition for each individual characteristic because of the amount of space such a detailed presentation would take (there would be twenty-four components for each stress outcome, or 144 for all six). The summary presentation more succinctly illuminates the major points that are revealed through this analysis. The contributions of important individual characteristics will be discussed in narrative. The full decompositions are available upon request.

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