Workplace Conditions, Socioeconomic Status, and the Risk of Mortality and Acute Myocardial Infarction: The Kuopio Ischemic Heart Disease Risk Factor Study

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ABSTRACT

Objectives. This study investigated whether the association between workplace conditions and the risk of all-cause and cardiovascular mortality and acute myocardial infarction differed by socioeconomic status.

Methods. Prospective data were used to examine these associations in 2297 Finnish men, with adjustment for prevalent diseases and biological, behavioral, and psychosocial covariates, and stratified by employment status and workplace social support.

Results. Elevated age-adjusted relative hazards for all-cause mortality were found for men who reported high demands, low resources, and low income; high demands, high resources, and low income; and low demands, high resources, and low income. Similar patterns were found for cardiovascular mortality. In contrast, elevated age-adjusted relative hazards for acute myocardial infarction were observed only in men who reported high demands, low resources, and low income. These results did not differ by level of workplace social support or employment status.

Conclusions. The negative effects of workplace conditions on mortality and of myocardial infarction risk depended on income level and were largely mediated by known risk factors. (*Am J Public Health.* 1997;87:617–622)

Introduction

Researchers' understanding of how organizational and psychosocial features of work affect morbidity and mortality has been greatly influenced by the idea that poor health outcomes may be associated with work that is psychologically demanding but offers few opportunities for control.[1–3] This notion has been operationalized in a variety of ways and has received empirical support in a large number of cross-sectional and case–control studies,[4] but when studied prospectively, the evidence has been more mixed.[5,6] In addition, relatively little is known about the pathways through which job characteristics might influence disease risk.[7]

In their review of these studies, Schnall and Landsbergis[4] suggest the need to expand the basic demand/control formulation to include other important workplace characteristics such as social support, physical exertion, job security, and hazardous exposures. They also argue that it is important to adjust the association between job conditions and disease risk to control for potential confounding by socioeconomic status (SES). Previous studies have generally adopted this line of reasoning and treated SES as a confounder of the association between job characteristics and health outcomes in an attempt to find the "independent" effect of workplace factors on health.[8–10]

In contrast, we believe that statistically partitioning the independent effects of SES and job conditions on disease risk ignores important structural connections between social class and work.[11] Furthermore, it is possible that having high levels of income or education may provide cognitive and tangible resources that could reduce the effects of poor working conditions on health. We investigated the association between workplace demands and resources and the risk of all-cause mortality, cardiovascular mortality, and incident acute myocardial infarction at different levels of SES, as measured by economic reward. These associations were examined prospectively in a population-based sample of Finnish men, with adjustment for prevalent diseases and biological, behavioral, and psychosocial covariates, and in subsamples stratified by employment status and workplace social support.

Methods

Study Population

The subjects were participants in the Kuopio Ischemic Heart Disease Risk Factor Study, which was designed to investigate previously unestablished risk factors for ischemic heart disease, carotid atherosclerosis, and other related outcomes in a population-based sample of men in eastern Finland.[12] Of 3433 eligible men aged 42, 48, 54, or 60 years resident in the town of Kuopio or its surrounding communities, 198 could not be included because of death, serious disease, or migration away from the area; of the remainder, 2682 (82.9%) agreed to

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participate in the study. Baseline examinations were conducted between March 1984 and December 1989. No marked sociodemographic differences have been found between participants and nonparticipants.[13] Complete information on workplace demands, resources, economic reward, and all covariates was available for 2297 men for the mortality analyses. There were 289, 315, 1387, and 306 men in the 42-, 48-, 54-, and 60-year-old age groups, respectively. A total of 570 of these men were excluded from the acute myocardial infarction incidence analyses (n = 1727) because of a prior history of acute myocardial infarction, angina pectoris, nitroglycerine use, or positive findings of angina from the London School of Hygiene Cardiovascular Questionnaire.[14]

Assessment of Workplace Demands, Resources, and Economic Reward

At the baseline examinations participants completed detailed questionnaires including items on aspects of their work environment, income, and education. Items that conformed to important theoretical domains discussed in the literature were considered for inclusion in the measurement of workplace demands.[4] In accordance with suggestions made in this literature, items on risk of unemployment, accidents, and physical exertion were included to supplement the questions about psychological demands. Participants were asked to rate on a Likert-type scale (0–4) how much mental strain or stress the following things caused them at work: excessive supervision of time schedules, troublesome supervisors, troublesome fellow workers, job responsibility, poorly defined tasks and responsibilities, risk of accidents, risk of unemployment, irregular work schedules, and the mental strenuousness of work. They were also asked how often they had work deadlines, how much stress this caused them, and the physical strenuousness of their work. Scores for the demands scale were imputed on the basis of nonmissing values for men who had no more than 2 missing items. Men who had more than 2 missing items were excluded from the analyses. The 11 individual items were dichotomized at the midpoint of the rating scale, so that only when men reported that the particular aspect of work caused them more than "average" strain were their responses considered positive. The dichotomized items were then summed to form the workplace demands scale, which had high internal consistency (Cronbach's alpha = .78).

Resources were assessed with questions asking participants to rate statements concerning the degree to which their work was interesting, allowed them to use their skills and capabilities, allowed them to feel composed and competent, was enjoyable, and was meaningful. Imputation of items and scoring of the resources scale were done in the same way as for demands (Cronbach's alpha = .77). Economic reward was assessed by self-reported income, dichotomized so that the lowest 40% of income earners were considered low. Previous analyses had shown that the bottom two quintiles of the income distribution were at significantly elevated risk of mortality and acute myocardial infarction.[15] The distributions of scores for demands and resources were dichotomized at the median, producing eight possible combinations of high and low demands, resources, and economic reward.

Assessment of Follow-Up Events

Participants were followed until the end of December 1994 for the mortality analyses, with a median follow-up of 8.1 years (range: 5.0–10.8). For the acute myocardial infarction analyses men were followed until the end of December 1992, for a median of 6.1 years (range: 3.0–8.8). All-cause and cardiovascular mortality were ascertained by linkage to the National Death Registry, which is maintained for all Finnish citizens. Classification of death was based on the underlying cause, reviewed at the National Center of Statistics of Finland. Cardiovascular deaths were classified according to the ninth revision of the *International Classification of Diseases* (ICD) for ICD codes 390–459. Of the 189 deaths, 93 were from cardiovascular causes.

First-event, nonfatal acute myocardial infarctions and coronary deaths were ascertained by linkage to an acute myocardial infarction register established under the World Health Organization's MONICA (Monitoring of Trends and Determinants of Cardiovascular Diseases) project.[16] There were 89 fatal or nonfatal incident acute myocardial infarctions recorded in this group of men.

Assessment of Covariates

As part of the baseline examinations, extensive information was collected on biological, behavioral, and psychosocial covariates. In addition, the prevalence of diseases was assessed by detailed medical histories. All covariates included in these analyses have been shown to be associated with mortality and acute myocardial infarction.[15]

Biological covariates. Biological covariates included plasma fibrinogen, high-density lipoprotein, serum apolipoprotein B (Apo B), serum triglycerides, blood hemoglobin and leukocyte count, serum ferritin and copper, hair mercury, systolic blood pressure, body mass index, height, and cardiorespiratory fitness. The methods of assessment for each of these factors have been previously described.[15,17–22]

Behavioral covariates. Alcohol consumption, measured in grams per week, was assessed by dietary recording for a 4-day period and also for the previous 12 months, by self-administered questionnaire.[23] Smoking was measured by questionnaire and classified for this analysis as "never smoked," "former smoker," and "current smoker" (measured in pack-years). The total duration (minutes per week) of conditioning physical activity was assessed from a 12-month leisure-time history.[22]

Psychosocial covariates. Depression was assessed from a shortened 180-item version of the Minnesota Multiphasic Personality Inventory that had previously been used in Finnish populations. Hopelessness was assessed with two questionnaire items, scored on a five-point Likert scale.[24] Marital status was assessed by questionnaire and categorized as "married," "single," or "divorced/widowed."

Prevalent diseases. Prevalent diseases were ascertained from detailed medical histories, medication records, and examinations at baseline. Indicator variables were used to represent a history of cardiovascular disease (symptomatic, asymptomatic, claudication or cardiomyopathy, and other), hypertension, stroke, diabetes, respiratory disease, and cancer.

Statistical Analysis

Associations between workplace demands, resources, and economic reward and all-cause mortality, cardiovascular mortality, and acute myocardial infarction were assessed with Cox proportional hazard models.[25] The analyses were conducted with the PHREG procedure in SAS version 6.09 on a Sun Sparc Station II.[26] To assess the impact of covariate adjustment on the age-adjusted relative hazards (RHs), we calculated the proportion of excess relative risk (hazard) accounted for by covariate adjustment as

$$[RH_{(\text{age adjusted})} - RH_{(\text{adjusted for age plus covariates})}]/[RH_{\text{age adjusted}} - 1]$$

TABLE 1—Workplace Demands, Resources, and Economic Reward and Prevalence of Selected Sociodemographic Characteristics at Baseline among Men in Eastern Finland (n = 2297)

Level of Demands/ Resources/ Income	No. (%)	Age 55 or Older, % (n = 346)	Farmers, % (n = 341)	Blue-Collar, % (n = 984)	White-Collar, % (n = 944)	Not Employed, % (n = 96)	Prevalent Ischemic Heart Disease, % (n = 570)	Low Social Support, % (752)	Completed High School, % (n = 393)
High/Low/Low	260 (11.3)	11.9	15.0	17.2	4.0	17.7	15.8	13.3	2.5
High/Low/High	353 (15.4)	12.1	5.6	13.8	20.1	17.7	13.9	20.6	19.1
Low/Low/Low	159 (6.9)	9.2	12.6	7.5	4.5	3.1	7.7	7.7	1.8
Low/Low/High	361 (15.7)	9.0	5.9	13.6	21.5	7.3	7.2	14.9	29.3
High/High/Low	261 (11.4)	17.1	19.1	15.4	4.6	18.8	20.5	9.4	1.3
High/High/High	244 (10.6)	11.0	6.7	10.6	12.3	14.6	12.1	10.1	12.2
Low/High/Low	243 (10.6)	12.4	24.1	10.5	5.8	11.5	11.9	10.4	1.8
Low/High/High	416 (18.1)	17.3	11.1	11.5	27.2	9.4	10.8	13.6	32.1

TABLE 2—Workplace Demands, Resources, and Economic Reward and the Relative Hazard (RH) of All-Cause Mortality among Men in Eastern Finland (n = 2297)

		Adjusted for Age Plus . . .				
Level of Demands/ Resources/Income	Adjusted for Age RH (95% CI)	Prevalent Disease[a] RH (95% CI)	Behavioral Covariates[b] RH (95% CI)	Psychosocial Covariates[c] RH (95% CI)	Biological Covariates[d] RH (95% CI)	All Covariates RH (95% CI)
High/Low/Low	3.00 (1.81, 4.98)	2.38 (1.42, 4.01)	2.58 (1.55, 4.31)	2.00 (1.16, 3.42)	2.33 (1.39, 3.89)	1.64 (0.94, 2.87)
High/Low/High	0.94 (0.50, 1.76)	0.85 (0.45, 1.60)	0.87 (0.46, 1.64)	0.76 (0.40, 1.44)	0.90 (0.48, 1.70)	0.79 (0.41, 1.50)
Low/Low/Low	1.05 (0.51, 2.16)	0.94 (0.45, 1.94)	1.04 (0.50, 2.14)	0.82 (0.39, 1.71)	0.86 (0.41, 1.79)	0.79 (0.38, 1.67)
Low/Low/High	0.74 (0.37, 1.47)	0.76 (0.38, 1.51)	0.72 (0.36, 1.42)	0.69 (0.33, 1.33)	0.78 (0.39, 1.56)	0.77 (0.38, 1.55)
High/High/Low	2.15 (1.26, 3.68)	1.61 (0.93, 2.80)	1.90 (1.11, 3.25)	1.58 (0.91, 2.75)	1.48 (0.86, 2.56)	1.11 (0.62, 1.98)
High/High/High	0.59 (0.26, 1.33)	0.53 (0.23, 1.18)	0.58 (0.26, 1.30)	0.52 (0.23, 1.18)	0.53 (0.23, 1.18)	0.47 (0.21, 1.08)
Low/High/Low	2.30 (1.35, 3.92)	1.97 (1.15, 3.37)	1.99 (1.16, 3.41)	1.83 (1.06, 3.15)	1.73 (1.01, 2.97)	1.30 (0.74, 2.27)
Low/High/High	Reference	Reference	Reference	Reference	Reference	Reference

Note. CI = confidence interval.
[a]Cardiovascular disease (symptomatic, asymptomatic, cardiomyopathy, claudication and other), hypertension, stroke, diabetes, respiratory disease, and cancer.
[b]Smoking, alcohol consumption, and physical activity.
[c]Hopelessness, depression, and marital status.
[d]Plasma fibrinogen, high-density lipoprotein, serum apolipoprotein B, serum triglycerides, blood hemoglobin and leukocytes, serum ferritin and copper, hair mercury, systolic blood pressure, body mass index, height, and cardiorespiratory fitness.

Results

The 27 covariates were grouped into four categories—prevalent diseases and biological, behavioral, and psychosocial covariates—and analyses conducted in two phases. First, we examined associations with separate adjustment for each group of covariates and age. In the second stage, associations were adjusted for age and all 27 covariates simultaneously. In all cases hazards were relative to the low-demands, high-resources, high-income group.

Table 1 shows sociodemographic characteristics for the eight combinations of demands, resources, and income. There were striking differences in the distribution of job demands, resources, and income by age, education, white-collar employment, prevalent ischemic heart disease, and unemployment. Men who had jobs with low demands were almost twice as likely as men in work with high demands to have completed high school (65% vs 35%).

Table 2 presents the relative hazards for all-cause mortality by combination of demands, resources, and income, adjusted for age, for age plus each covariate group separately, and for age plus all covariates simultaneously. Significantly elevated age-adjusted relative hazards for all-cause mortality were found for men who reported high demands, low resources, and low income (RH = 3.00; 95% confidence interval [CI] = 1.81, 4.98); high demands, high resources, and low income (RH = 2.15; 95% CI = 1.26, 3.68); and low demands, high resources, and low income (RH = 2.30; 95% CI = 1.35, 3.92). Separate adjustment for each covariate group attenuated the magnitude of the associations. For example, the excess relative hazard for the high-demand, low-resource, low income group was reduced by 31% after adjustment for prevalent disease, by 21% after adjustment for behavioral covariates, by 50% after adjustment for psychosocial covariates, and by 34% after adjustment for biological covariates. Simultaneous adjustment for all covariates reduced the excess relative hazard by 68%.

Table 3 presents the relative hazards for cardiovascular mortality by combination of demands, resources, and income, with the same adjustments by age and covariates. The pattern of findings was very similar to that for all-cause mortality. Significantly elevated age-adjusted rela-

TABLE 3—Workplace Demands, Resources, and Economic Reward and the Relative Hazard (RH) of Cardiovascular Mortality among Men in Eastern Finland (n = 2297)

Level of Demands/ Resources/ Income	Adjusted for Age RH (95% CI)	Adjusted for Age Plus . . .[a] Prevalent Disease RH (95% CI)	Behavioral Covariates RH (95% CI)	Psychosocial Covariates RH (95% CI)	Biological Covariates RH (95% CI)	All Covariates RH (95% CI)
High/Low/Low	3.12 (1.48, 6.60)	2.05 (0.96, 4.40)	2.59 (1.22, 5.52)	1.94 (0.88, 4.29)	2.28 (1.07, 4.89)	1.54 (0.67, 3.54)
High/Low/High	0.97 (0.38, 2.45)	0.80 (0.31, 2.03)	0.91 (0.36, 2.32)	0.74 (0.29, 1.90)	0.88 (0.34, 2.24)	0.82 (0.31, 2.14)
Low/Low/Low	1.49 (0.57, 3.93)	1.16 (0.44, 3.08)	1.43 (0.54, 3.78)	1.13 (0.42, 3.01)	1.03 (0.38, 2.75)	0.83 (0.30, 2.33)
Low/Low/High	0.87 (0.33, 2.28)	0.89 (0.34, 2.35)	0.84 (0.32, 2.20)	0.76 (0.29, 2.01)	0.97 (0.36, 2.56)	0.94 (0.35, 2.55)
High/High/Low	2.75 (1.28, 5.90)	1.53 (0.69, 3.37)	2.33 (1.08, 5.03)	1.95 (0.88, 4.29)	1.63 (0.74, 3.58)	1.12 (0.48, 2.61)
High/High/High	0.49 (0.14, 1.78)	0.39 (0.11, 1.43)	0.47 (0.13, 1.72)	0.42 (0.11, 1.52)	0.39 (0.11, 1.43)	0.37 (0.10, 1.35)
Low/High/Low	2.29 (1.03, 5.06)	1.72 (0.77, 3.82)	1.88 (0.84, 4.21)	1.84 (0.82, 4.13)	1.49 (0.66, 3.35)	0.99 (0.42, 2.30)
Low/High/High	Reference	Reference	Reference	Reference	Reference	Reference

Note. CI = confidence interval.
[a]Covariates as in Table 2.

TABLE 4—Workplace Demands, Resources, and Economic Reward and the Relative Hazard (RH) of Incident Acute Myocardial Infarction among Men in Eastern Finland (n = 1727)

Level of Demands/ Resources/Income	No.	Adjusted for Age RH (95% CI)	Adjusted for Age Plus . . .[a] Behavioral Covariates RH (95% CI)	Psychosocial Covariates RH (95% CI)	Biological Covariates RH (95% CI)	All Covariates RH (95% CI)
High/Low/Low	170	2.59 (1.36, 4.94)	2.30 (1.20, 4.41)	2.18 (1.11, 4.28)	1.94 (1.00, 3.76)	1.57 (0.78, 3.18)
High/Low/High	274	0.67 (0.29, 1.57)	0.60 (0.26, 1.41)	0.61 (0.26, 1.43)	0.61 (0.26, 1.44)	0.50 (0.21, 1.20)
Low/Low/Low	115	0.62 (0.21, 1.87)	0.60 (0.20, 1.81)	0.56 (0.18, 1.69)	0.54 (0.18, 1.62)	0.41 (0.13, 1.29)
Low/Low/High	320	1.25 (0.63, 2.49)	1.22 (0.61, 2.41)	1.24 (0.62, 2.46)	1.30 (0.65, 2.58)	1.11 (0.55, 2.24)
High/High/Low	144	1.04 (0.44, 2.44)	0.91 (0.39, 2.15)	0.86 (0.36, 2.07)	0.62 (0.25, 1.50)	0.55 (0.22, 1.35)
High/High/High	175	0.63 (0.23, 1.71)	0.60 (0.22, 1.64)	0.59 (0.22, 1.62)	0.52 (0.19, 1.44)	0.43 (0.15, 1.22)
Low/High/Low	175	0.93 (0.41, 2.10)	0.83 (0.36, 1.89)	0.85 (0.37, 1.95)	0.70 (0.30, 1.60)	0.65 (0.28, 1.52)
Low/High/High	354	Reference	Reference	Reference	Reference	Reference

Note. CI = confidence interval.
[a]Covariates as in Table 2.

tive hazards for cardiovascular mortality were found in the same groups as for all-cause mortality. Separate adjustment for each covariate group attenuated the magnitude of the associations. Simultaneous adjustment for all covariates reduced the excess relative hazard by 75%.

Table 4 presents the relative hazards for incident cases of acute myocardial infarction by combination of demands, resources, and income, adjusted for age, for age plus each covariate group separately, and for age plus all covariates simultaneously. As 570 men with prevalent ischemic heart disease had already been excluded from these analyses, there was no further adjustment for other prevalent diseases. In contrast to mortality, significantly elevated age-adjusted relative hazards for acute myocardial infarction were observed only in men who reported high demands, low resources, and low income (RH = 2.59; 95% CI = 1.36, 4.94). Simultaneous adjustment for behavioral, psychosocial, and biological covariates decreased the age-adjusted relative hazard for men with high demands, low resources, and low incomes by 64% to 1.57 (95% CI = 0.78, 3.18).

Discussion

These results show that the effect of job conditions on mortality and acute myocardial infarction depends on the level of economic reward, and that these associations are largely mediated by known risk factors. Our findings are consistent with the effort–reward imbalance model proposed by Siegrist, which suggests that the imbalance between high job demands and high psychological immersion in work roles and low economic and psychosocial rewards is associated with poor health outcomes.[27] In addition, these findings are consistent with evidence from other studies, which found stronger associations between poor job conditions and health in less educated men and in blue-collar workers.[3] However, in stratified analyses (not shown), there was no evidence that the patterns of increased mortality and acute myocardial infarction risk differed by the level of workplace social support.

Similar patterns of increased risk were found for both all-cause and cardiovascular mortality. The highest mortality risks were found in men whose work was demanding with low resources and low economic reward, while men with the same levels of demand and economic reward but with high resources had

somewhat lower mortality risks. Surprisingly, we found elevated mortality risks in men with low-demand, high-resource, low-income jobs (RH = 2.30). This might be explained as an effect of low income, but men with the same level of job demands and income but low resources were not at increased risk. As the low-demand, high-resource, low-income group had the highest proportion of farm and forestry workers (31%), it is possible that the measures of demands and resources used in this study did not fully address specific negative job characteristics, such as close exposure to organic and chemical pollution, associated with work in these occupations.[28] In addition, the fact that men in jobs with low demands, high resources, and low incomes were not at increased risk of acute myocardial infarction suggests that other factors might be responsible for their increased mortality risk.

When the association between job conditions, income, and mortality was adjusted for covariates, biological risk factors reduced the magnitude of the associations by between 34% and 60%. In addition, psychosocial factors and prevalent diseases reduced the associations by as much as 50%. However, as job conditions, income, psychosocial characteristics, and prevalent diseases were all assessed at the same point in time, it is impossible to disentangle their temporal sequencing. One interpretation of these results is that over time, the effects of poor working conditions and low economic reward lead to feelings of hopelessness and depression, poorer behavioral and biological risk factor profiles, and higher levels of morbidity, which contribute to increased mortality risk. As we have argued elsewhere, adjustment for factors that may be consequences of working in poor conditions with low economic rewards would constitute overadjustment.[29]

The association between job conditions, economic reward, and incident acute myocardial infarction showed that men in high-demand, low-resource, low-income jobs had an age-adjusted risk of acute myocardial infarction that was more than 2.5 times that of men with low-demand, high-resource, high-income jobs. The magnitude of this association was reduced by more than 40% with adjustment for biological risk factors for acute myocardial infarction, and by over 60% with simultaneous adjustment for all covariates.

Several issues should be mentioned before conclusions are drawn from these results. First, the measure of workplace demands may have been subject to reporting bias because it was based on a self-assessment of the extent of stress or strain associated with aspects of work, although mortality and acute myocardial infarction risks remained elevated even after adjustment for depression and hopelessness. While the most accurate assessment of job demands and resources would be achieved by a combination of subjective and objective measures, high correlations between subjective assessments and expert ratings of job conditions have been demonstrated.[30] Furthermore, there is no rationale for how a bias in the self-reporting of job demands could explain the overall income-dependent pattern of our findings for mortality and acute myocardial infarction. Second, it is possible that the measure of resources used in this study did not fully capture both the "skill discretion" and "decision authority" dimensions of workplace control that have been suggested as important modifiers of workplace demands.[30]

Third, our assessment of job demands, resources, and income was based on a single measurement and does not take into account changes in job exposures over time. Furthermore, structural alterations to the Finnish economy have seen large increases in unemployment and changes in the occupational structure of the region.[31] However, our results were no different in stratified analyses (not shown) that excluded men who reported any change in job title over the last 10 years or in other analyses that excluded men who were either unemployed or retired at baseline.

Fourth, while our findings are based on a population of men in eastern Finland, we believe these results may be applicable to similar populations beyond the immediate confines of the region. Kuopio is the major provincial center in eastern Finland and has an administrative, industrial, and service-based economy dominated by processing of farm, food, metal, and forest products. Most risk factors for mortality and acute myocardial infarction in Finland have been documented in other populations.[32] However, because this sample is limited to middle-aged men, it is unclear whether these findings can be applied to the relationship between working conditions and income and mortality and acute myocardial infarction in women.

To our knowledge, this is the first study to show that an increased mortality and acute myocardial infarction risk associated with organizational, physical, psychological, and social aspects of work was concentrated in low-income groups. With respect to informing interventions, our findings could be interpreted in three contexts. First, while there are a myriad of health-related interventions that target the workplace, relatively few—with perhaps the exception of programs to reduce toxic exposures—directly address the physical, organizational, psychosocial nature of work itself. The majority of so-called workplace programs are individually oriented psychosocial and behavioral modification interventions that use the workplace as the site of program delivery. In this context, our findings imply that these efforts will be most effective by attempting to alter the risk factor profiles of low-income workers.

Second, a similar interpretation of our results suggests that interventions that do focus on the actual task requirements and organizational characteristics of work should also focus on those low-income groups that bear the highest cardiovascular disease and mortality burden. These interventions could focus on workplace design by reducing psychological and physical demands and increasing skill utilization, job satisfaction, and economic rewards. This approach would consider low income as an internal feature of the workplace, which, like other job demands and resources, could be modified. While efforts to improve the conditions and economic returns of work would be laudable, it is also important to remember that low income is representative of a whole set of life experiences that extend beyond work life into family, recreational, and social domains.

Third, we have shown that jobs with higher demands are more prevalent in low-SES groups. In addition, low-SES groups have fewer educational and economic resources with which to gain better jobs over time, and so may have greater exposure to poor working conditions over the lifecourse. In this way, social position structures both the likelihood and duration of exposure to work that is detrimental to health. Several investigators have argued that the effect of work conditions on health must be considered in the context of the powerful economic, political, and social forces that determine both the distribution of and changes in potentially pathogenic job characteristics across different population groups.[11,33–37] These broader structural features of society determine the types of jobs that are available for particular sectors of the population.

Interventions that focus on the reward and organizational features of extant jobs will not necessarily affect the powerful economic, political, social, and technological forces that generate and sustain both jobs with poor conditions of employment and the system of social stratification that constrains employment opportunities for low-SES workers. Increased economic rewards, job enrichment, and work democratization are important, but they should exist within a broader context of life enrichment and social democratization for low-SES groups. If poor job conditions are just one of many deleterious exposures for people of low SES, then we need to see the relationship between work conditions and health in the broader framework of a series of interacting circumstances, events, and behaviors that cascade over the lifecourse[38,39] and that ultimately place low-SES groups at higher risk of morbidity and mortality. □

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