Is the Impact of Job Control on Stroke Independent From Socioeconomic Status?
A Large-Scale Study of the Swedish Working Population

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Background and Purpose—The main purpose of this study was to test whether the impact of job control on stroke mortality is independent of socioeconomic factors.

Methods—This was a register-based cohort study of nearly 3.5 million working people (25 to 64 years of age in the 1990 Swedish Census) with a 5-year follow-up for stroke mortality. Job control was aggregated to the data from a secondary data source (job exposure matrix). Gender-specific Poisson regressions were performed.

Results—Compared with high job control occupations, low job control was significantly related to hemorrhagic (relative risk, 1.54; 95% CI, 1.10 to 2.17) and all-stroke mortality (relative risk, 1.50; 95% CI, 1.11 to 2.03) in women but not in men. The significance of job control in women was independent of all confounders included (marital status, education level, and occupational class). Class-specific analyses indicated a consistent effect of job control for most classes (significant for female lower nonmanuals). However, low job control did not increase the risk of stroke mortality in upper nonmanuals.

Conclusions—Job control was significantly related to hemorrhagic and all-stroke mortality in women but not in men. (Stroke. 2008;39:000-000.)

Key Words: epidemiology ■ job control ■ mortality ■ occupational class ■ stroke

It is well known that low job control increases the risk of cardiovascular disease1,2 and coronary heart disease,2,3 but the results for stroke are inconclusive.4,5 Whether the impact of job control is independent of or confounded by occupational class or other socioeconomic circumstances is currently under debate.6,7 Therefore, the aim of the present study was to investigate the association between job control and stroke mortality in the working population in Sweden, taking such factors into account.

Materials and Methods
We used population registry data from the 1990 Swedish Census that were linked to the national Cause-of-Death Registry (November 1, 1990, to December 31, 1995). Occupational holders 25 to 64 years of age in 1990, who did not emigrate during the follow-up period, were included (3 438 502 persons; 17.7 million person-years). Stroke mortality was divided into 2 main subtypes based on International Classification of Diseases, 9th Revision codes: hemorrhagic (430 to 432) and ischemic or unspecified type (433 to 438).

Mean job control exposures (0 to 10) stratified by gender and age groups (16 to 29, 30 to 44, 45 to 64) have been estimated based on the Swedish Surveys of Working Conditions (nearly 50 000 respondents) for the period 1989 to 1997 for 320 occupational families (3-digit Nordic Occupational Classification Codes).8 Information from this job exposure matrix was used to impute exposures to each occupational code in the census ( exposure among 16 to 29 years old used for those 25 to 29 years in our data). First, we classified job control into gender-specific quintiles (Q1 to Q5). High job control (Q1) was used as the reference group and compared with intermediate (Q2 to Q4) and low job control (Q5). Second, we performed analyses using the continuous (0 to 10) job control variable.

Five-year age groups, marital status (never married, married, divorced, widowed), education level (unknown, 6 levels), and occupational class (7 classes) were included as potential confounders in gender-specific multivariate Poisson regressions. Job control is defined on the basis of 3-digit occupational codes and occupational classes on the basis of 5-digit occupational codes. Therefore, a specific job control exposure may be the same for up to 5 occupational classes. Thus, the objective job control measure is not biased by having been classified on the same aggregate occupational level as class.

Results
Job control was significantly related to stroke mortality in women but not in men (Table). In women, the effect of low job control was stronger for hemorrhagic than for ischemic stroke. Estimates clearly decreased after adjusting for education and class. In the fully adjusted model, job control was significantly related to hemorrhagic and all-stroke mortality. For all outcomes, and for both genders, class was insignificant in Model 5. Results were similar for the continuous measure of job control. A one-unit increase in mean job control level was associated with a decreased risk of stroke mortality (not significant for ischemic stroke).
Because job control was significant in women, class-specific analyses were justified for them. In the present cohort, there was variation in job control within most classes (except for farmers) as well as across genders and age groups. Standard deviations in mean job control scores were greater among unskilled manuals (1.11) and lower nonmanuals (1.08) than among higher nonmanuals (0.86). In the class-specific analyses, entrepreneurs and farmers (self-employed) and intermediate and higher nonmanuals (upper nonmanuals) were combined, and 4 education levels (unknown, basic,
secondary, tertiary) were controlled for to increase power. Job control was significant for lower nonmanuals (Figure). The effect was similar, yet not significant, for manual and self-employed classes. There was no effect of job control for upper nonmanuals.

**Discussion**

It has been proposed (in theory) that job control is nearly interchangeable with occupational class, although empirical findings report significant effects of psychosocial work factors within classes. The job exposure matrix is a crude method of exposure assessment in that it is assumed that everyone with the same job title (differentiated by gender and age) has the same level of job control. Thus, some of the true variation in job control is eliminated. We were therefore surprised by the empirical variation in mean job control levels within the manual and lower nonmanual classes, variation that contributed to the net influence of job control on women’s stroke mortality (but not on men’s).

The effect of job control was consistent in all classes except for upper nonmanuals, in which the overall level of job control is high and the variability is small. In women, we observed similar effects of low job control in manual workers and lower nonmanuals. One possible explanation is that, in these occupations, low job control is often combined with high psychological (“job strain”) or physical demands. Women’s experience of domestic stressors may also interact with harmful job exposures. Testing these hypotheses, however, would require individual-level data.

**Sources of Funding**

This study was supported by the Swedish Council for Working Life and Social Research (FAS), grant no. 2001-2934 and 2005-1723, and the Department of Sociology, Stockholm University.

**Disclosures**

None.

**References**

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Stroke. published online February 28, 2008;
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 2008 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/early/2008/02/28/STROKEAHA.107.495523.citation

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