

Letters to the Editor

RE: "NEED FOR MORE INDIVIDUAL-LEVEL META-ANALYSES IN SOCIAL EPIDEMIOLOGY: EXAMPLE OF JOB STRAIN AND CORONARY HEART DISEASE"

Although we read with interest the commentary by Kivimäki and Kawachi (1) on the need for more individual-level meta-analyses in social epidemiology, we do not agree with the authors that the findings in the article by Kivimäki et al. (2) resolve 3 longstanding debates in the literature on 30-year job strain and coronary heart disease (CHD), namely: 1) the relative importance of job strain components (job control and job demands) in relation to CHD; 2) differences in the association between job strain and CHD by age and sex; and 3) differences in the association between job strain and CHD by socioeconomic status (SES). First, of the 13 European cohort data sets that Kivimäki et al. used for the meta-analysis (2), only 3 had been published, whereas the remaining 10 data sets were unpublished. Data from many published cohort studies from European and non-European countries were not included. A recent review by Eller et al. (3) of studies published through February 2009 included 13 articles on cohort studies that contained information on the association between job strain and CHD, and there were at least 17 such studies in a recent review of the published literature through March 2013 that we conducted. A comprehensive meta-analysis based on all existing published and unpublished cohort data could generate better information to address the longstanding issues.

The 13 cohorts included in the Individual-Participant-Data Meta-analysis of Working Populations (IPD-Work) Consortium article (2) also have intrinsic limitations for drawing definitive answers to the longstanding debates: Only 3 of the cohorts were randomly selected from general working populations that had participation rates of more than 50%, and most of the others were recruited from white-collar organizations (4). Workers facing job strain are less likely to participate in occupational health studies than are workers who are not facing job strain (5), and the prevalence of job strain is generally lower in white-collar occupations than in blue-collar occupations (6). Thus, low SES strata and job strain groups are both likely to be underrepresented in the IPD-Work paper, in which job strain was more strongly associated with CHD in higher SES strata than in lower SES strata (hazard ratios = 1.65 vs. 1.24, respectively). Therefore, the debate regarding SES differences in associations cannot be resolved with the limited IPD-Work data. The underrepresentation likely restricts the ranges of job strain and its components (particularly job control (6, 7)), potentially leading to an underestimation of the true associations of job strain and its components with CHD (8). Restriction of range also makes it more difficult to make a strong claim about the relative importance of the job strain components.

Additionally, 4 cohort studies that were not qualified to provide a harmonized job strain measure were included in the IPD-Work paper (2). Job strain was measured with several

different instruments with either complete or incomplete scales of job control and psychological job demands across the IPD-Work cohorts. IPD-Work researchers (9) concluded that job strain measured with 1 complete scale (e.g., job control) and 1 incomplete scale (e.g., psychological job demand) could be considered to assess the same construct across the cohorts. However, 4 cohorts (Danish Work Environment Cohort Study, Netherlands Working Conditions Survey, Permanent Onderzoek Leefsituatie, and Still Working) of the 13 in the article by Kivimäki et al. (2) did not meet the criterion (i.e., job strain was measured with 1 incomplete job control scale and 1 incomplete job demand scale) (10). We calculated a higher association between job strain and CHD (when including only the 9 qualifying cohorts, hazard ratio = 1.32; with all 13 cohorts, hazard ratio = 1.23) (10). However, it is largely unknown how the use of unqualified cohorts affected the findings of the meta-analysis (2) on the 3 longstanding issues (e.g., SES differences in associations). Despite some methodological merits (e.g., access to individual data) of an individual-level meta-analysis over a conventional meta-analysis (11, 12), it is not a panacea for all methodological and interpretation issues as noted above.

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RE: “NEED FOR MORE INDIVIDUAL-LEVEL META-ANALYSES IN SOCIAL EPIDEMIOLOGY: EXAMPLE OF JOB STRAIN AND CORONARY HEART DISEASE”

We were surprised to read that longstanding debates on the association between job strain (high-demand and low-control work) and coronary heart disease “were resolved” as the result of 1 meta-analysis of 13 cohort studies using “an individual-participant data meta-analysis approach” (1, p. 1). In fact, the conservative estimate of association provided was likely the consequence of biases towards the null in the 13 studies that were unacknowledged in the meta-analysis (2). A previous review (3) documented that 15 of 17 cohort studies of job strain and cardiovascular disease were dominated by biases towards the null.

First, restriction of the range of exposure created a bias towards the null. Only 3 of the 13 cohort studies in the meta-analysis (2) were randomly selected from general working populations in which the participation rates were greater than 50%; most of the others were recruited from white-collar organizations (4). The prevalence of job strain is generally lower in white-collar occupations than in blue-collar occupations (5). Workers in the most stressful jobs (industrial, sweatshop, and temporary workers and undocumented immigrants) were much less likely to be included in the 13 studies. Workers with job strain are also less likely to participate in research studies (6). Although previous studies suggested that there was a stronger association between job strain and coronary heart disease in lower (vs. higher) socioeconomic groups (7, 8), the meta-analysis by Kivimäki et al. (2) suggested that there was a stronger association (although no significant effect modification) in higher socioeconomic groups, raising questions about the potential impact of restricted occupational variance in the 13 cohorts. Moreover, the meta-analysis included studies only from Northern Europe, thus severely limiting its external validity. The focus on Scandinavian cohorts (51% of person-years in the meta-analysis) is problematic, given the weaker associations observed between work stressors and depression symptoms in Scandinavian countries compared with other European countries (9). Therefore, the summary effect estimate of 1.23 (95% confidence interval: 1.10, 1.37) and population attributable risk of 3.4% are likely to be underestimates of the true effect not only in Northern European countries but also in other European countries and even more so in industrializing

countries such as China, which are likely to have a much higher prevalence and severity of job strain.

Second, all 13 cohort studies suffered from 2 forms of exposure misclassification: the use of median cut points (which are arbitrary) for job demands and job control to define job strain and the measurement of job strain, an exposure that can change over time, only at baseline and not at follow-up. Additionally, in 9 of 11 studies in the meta-analysis in which such data were available, a proportion of the sample became 65 years of age or older during follow-up. Because job strain is associated with earlier retirement (10, 11), this creates an additional bias toward the null. Although the authors (1) cited the Whitehall II study (1 of the 13 cohort studies) as an example of weaker associations between job strain and coronary heart disease associations in older (vs. younger) age groups (12), in fact, Whitehall II is an example of risk attenuation due to retirement. There is a much weaker association in the group aged approximately 62–72 years at the end of follow-up than in the group aged 49–61 years at the end of follow-up, a limitation acknowledged by the authors of that Whitehall II paper (12).

In summary, despite the promise of individual-participant data meta-analyses, such analyses are limited by the limitations of the included studies and may simply not be affordable or feasible in many areas of the world. Therefore, the longstanding debates in the job strain literature remain unresolved, awaiting a more comprehensive meta-analysis of the many existing cohort studies of this association that were not included in the current meta-analysis (3, 13).

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