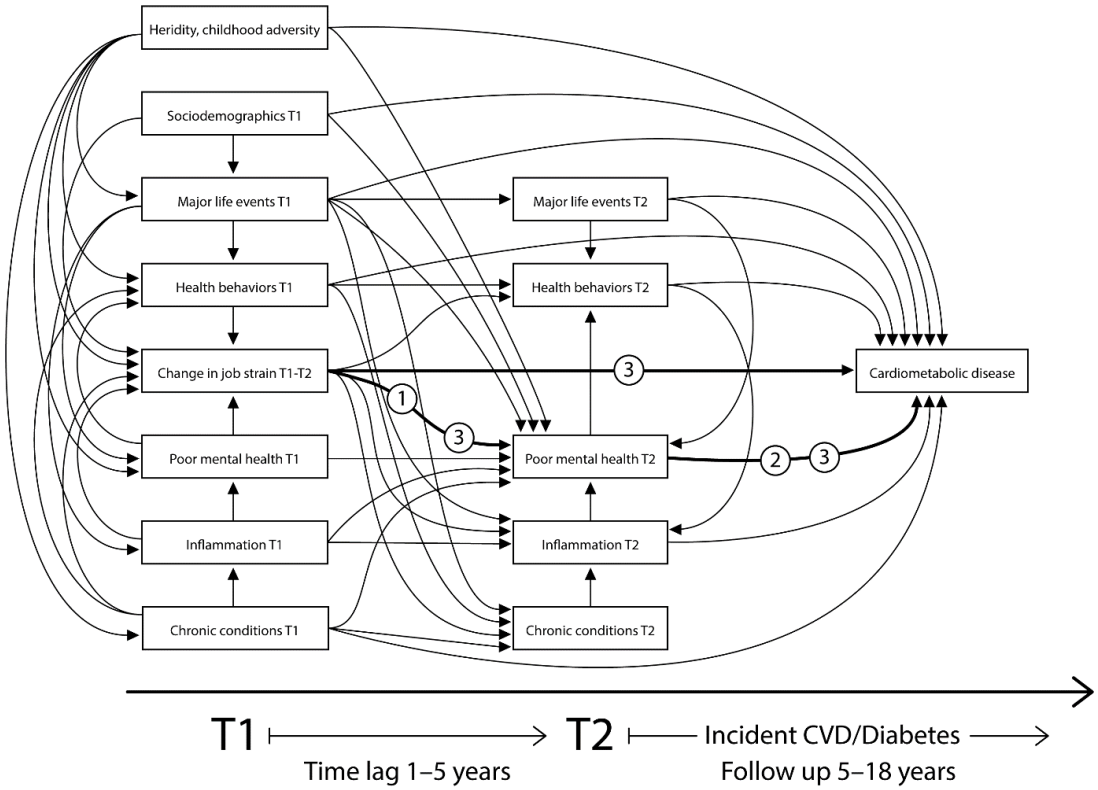
SUPPLEMENTARY MATERIAL

Supplementary Figures- design



Supplementary Figure 1. Assumed Directed Acyclic Graph also illustrating the associations of interest in the different analyses.

1 -Path of interest in the analyses on job strain and poor mental health

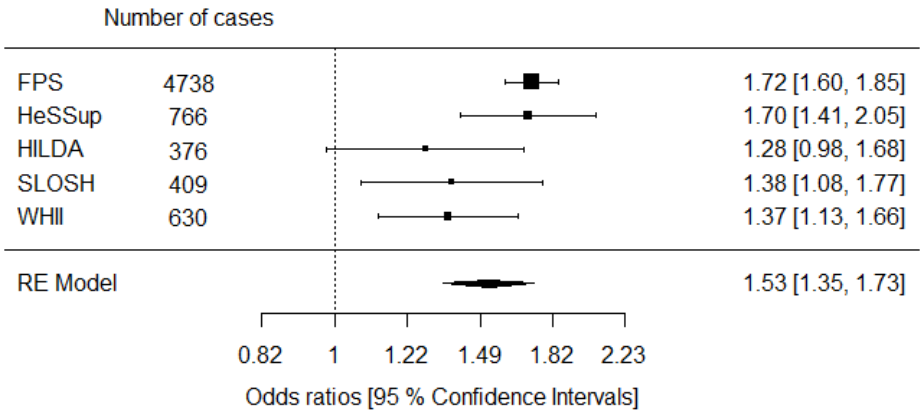
2 -Path of interest in the analyses on poor mental health and cardiometabolic disease.

3-Paths of interest in the analyses on job strain and cardiometabolic disease and mediation analyses

Sociodemographics are here used to represent factors such as sex, age and socioeconomic status, and life style factors represent factors such as smoking, alcohol consumption, physical inactivity and obesity. Inflammation was used to exemplify biological reactions, while chronic conditions used to

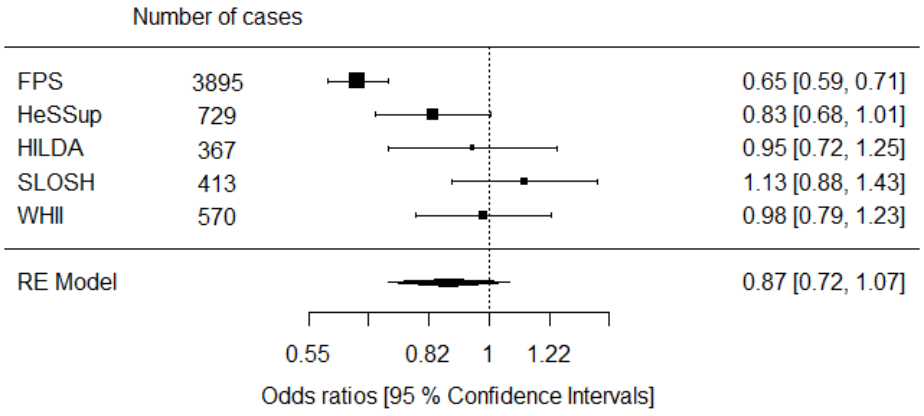
represent certain conditions such as chronic obstructive pulmonary disease, musculoskeletal problems and cancer that were assumed relevant.

Supplementary Figures –results from minimally adjusted models analyzing the association between change in job strain and poor mental health



Supplementary Figure 2. Results from logistic regression analyses assessing the relationship between *increase in job strain* between T1 and T2 and poor mental health T2, adjusting for sex, age and occupational position.

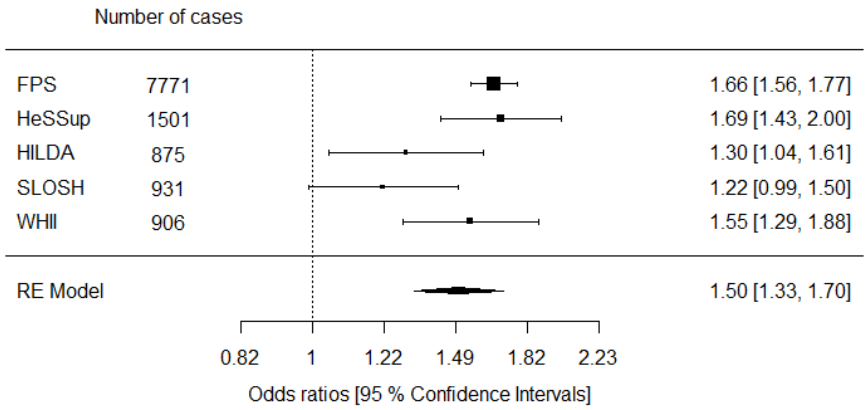
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)



Supplementary Figure 3. Results from logistic regression analyses assessing relationship between *decrease in job strain* between T1 and T2 and poor mental health at T2, adjusting for sex, age and occupational position.

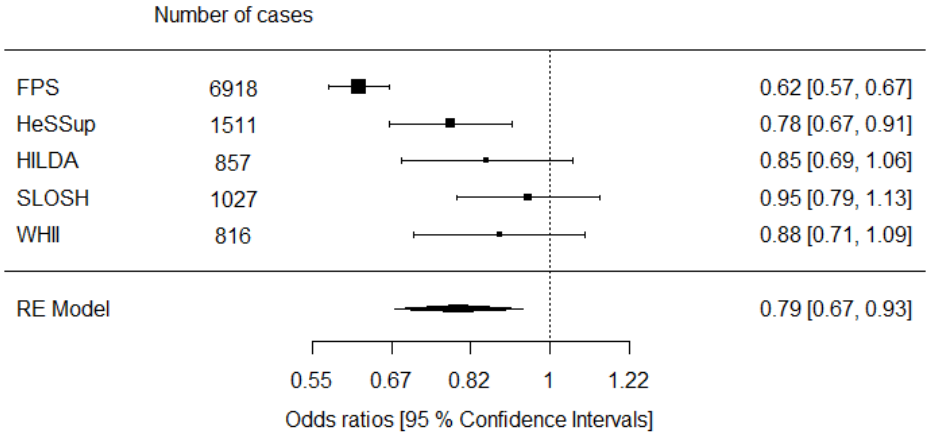
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

Supplementary Figures –results from the fully adjusted models analyzing the association between change in job strain and poor mental health from the sensitivity analyses including people with poor mental health T1 but adjusting for poor mental health T1



Supplementary Figure 4. Results from logistic regression analyses assessing the relationship between *increase in job strain* between T1 and T2 and poor mental health T2, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking, and poor mental health.

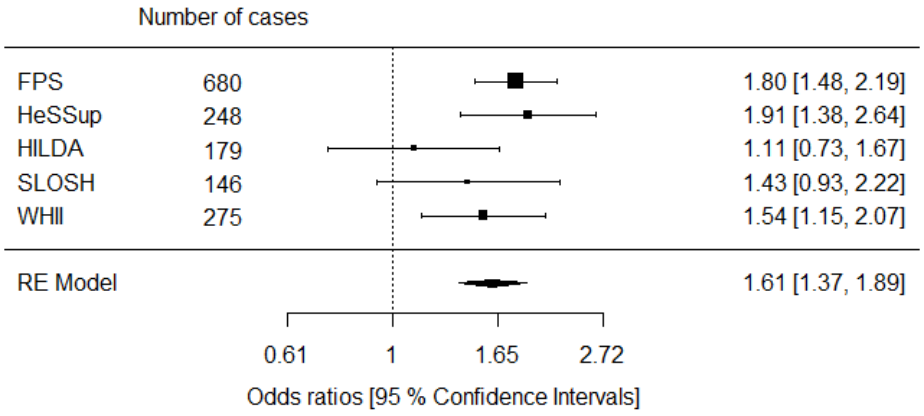
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)



Supplementary Figure 5. Results from logistic regression analyses assessing the relationship between *decrease in job strain* between T1 and T2 and poor mental health T2, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking, and poor mental health.

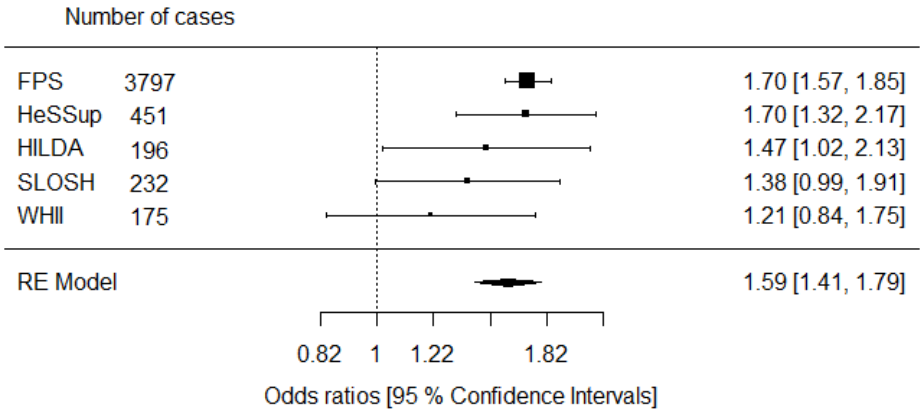
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

Supplementary Figures –results from the fully adjusted models analyzing the association between change in job strain and poor mental health stratified by sex



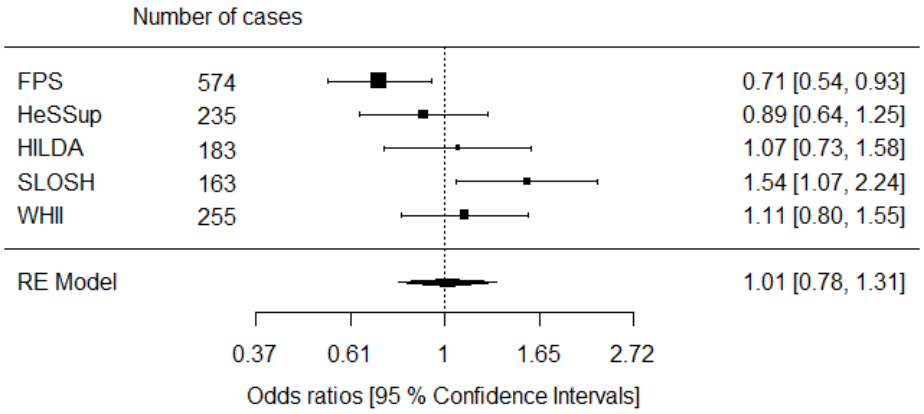
Supplementary Figure 6. Results from logistic regression analyses assessing the relationship between *increase in job strain* between T1 and T2 and poor mental health T2 *among men*, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, and smoking.

FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)



Supplementary Figure 7. Results from logistic regression analyses assessing the relationship between *increase in job strain* between T1 and T2 and poor mental health T2 *among women*, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, and smoking.

FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)



Supplementary Figure 8. Results from logistic regression analyses assessing relationship between *decrease in job strain* between T1 and T2 and poor mental health at T2 *among men*, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, and smoking.

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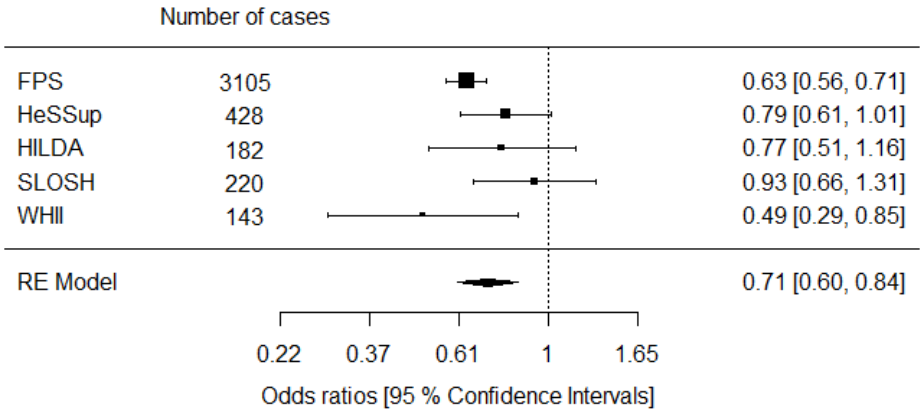

Supplementary Figure 9. Results from logistic regression analyses assessing relationship between *decrease in job strain* between T1 and T2 and poor mental health at T2 *among women*, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, and smoking.

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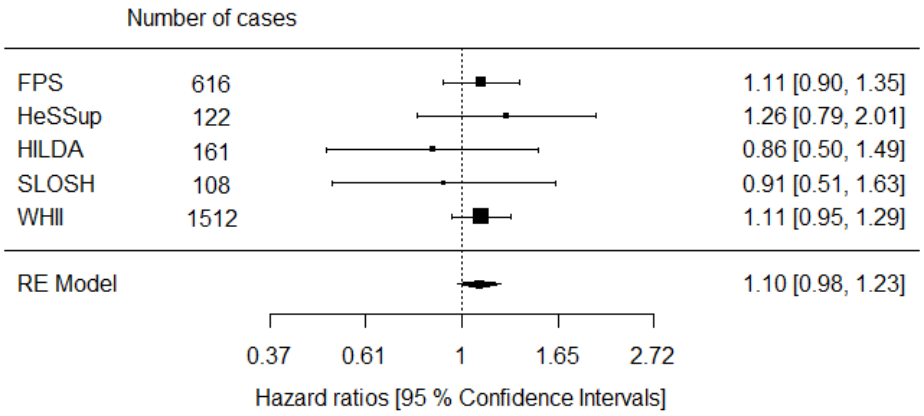
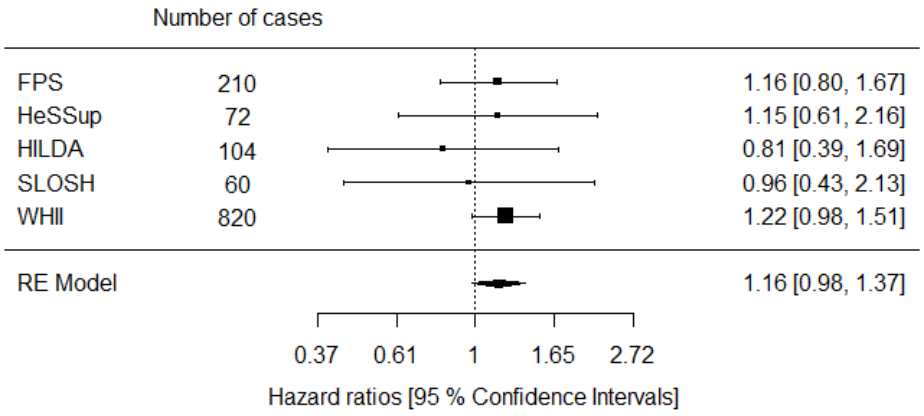
Supplementary Figure –results from the minimally adjusted models analyzing the association between poor mental health and cardiometabolic disease



Supplementary Figure 10. Results from Cox regression analyses assessing relationship between poor mental health T2 and incident cardiometabolic disease, adjusting for sex, age, occupational position as well as job strain

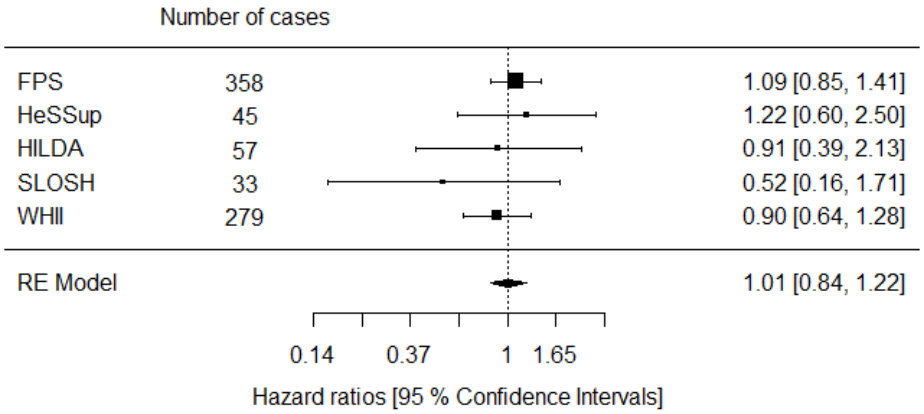
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

Supplementary Figures –results from the fully adjusted models analyzing the association between poor mental health and cardiometabolic disease stratified by sex



Supplementary Figure 11. Results from Cox regression analyses assessing relationship between poor mental health T2 and incident cardiometabolic disease *among men*, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking, as well as job strain.

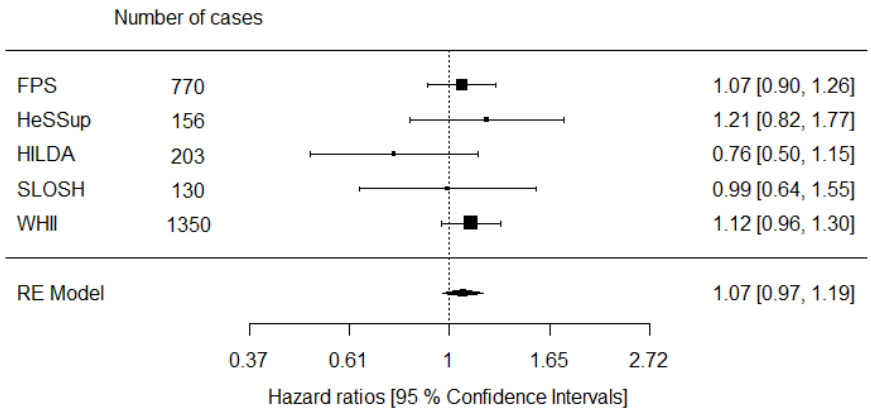
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)



Supplementary Figure 12. Results from Cox regression analyses assessing relationship between poor mental health T2 and incident cardiometabolic disease *among women*, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking, as well as job strain

FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

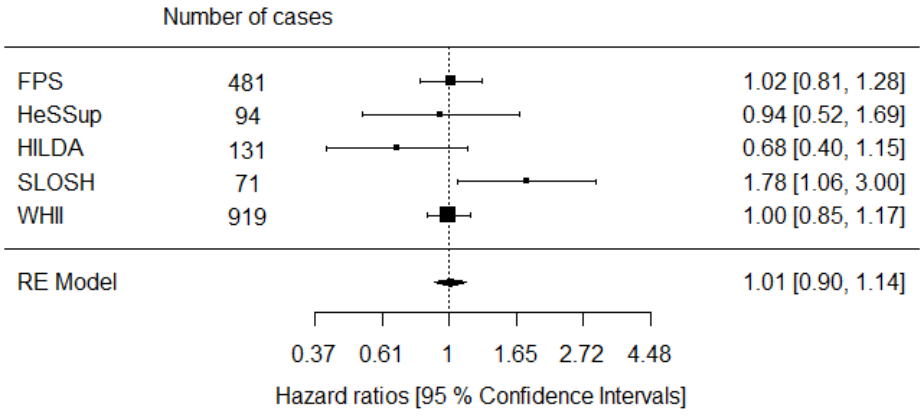
Supplementary Figure –results from the fully adjusted models analyzing the association between poor mental health and cardiometabolic disease from the sensitivity analyses including people with poor mental health T1 but adjusting for poor mental health T1



Supplementary Figure 13. Results from Cox regression analyses assessing relationship between poor mental health T2 and incident cardiometabolic disease, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking, as well as job strain and poor mental health.

FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

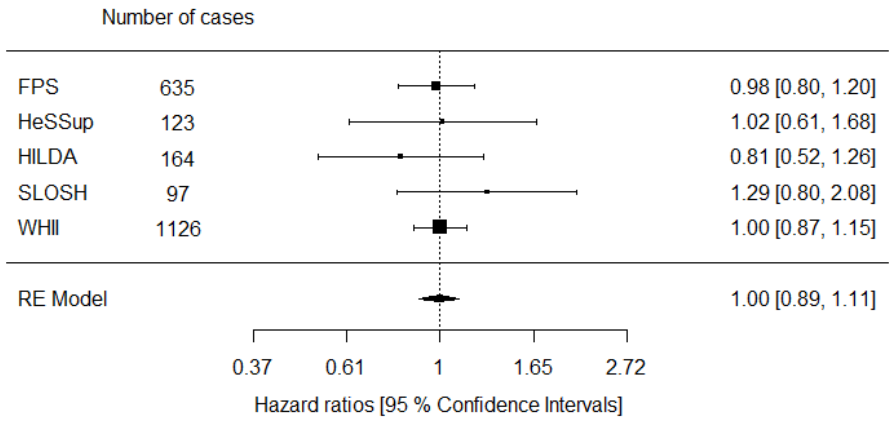
Supplementary Figure –results from the fully adjusted models analyzing the association between change in job strain and cardiometabolic disease



Supplementary Figure 14. Results from Cox regression analyses assessing relationship between *increase in job strain* between T1 and T2 and incident cardiometabolic disease, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, and smoking

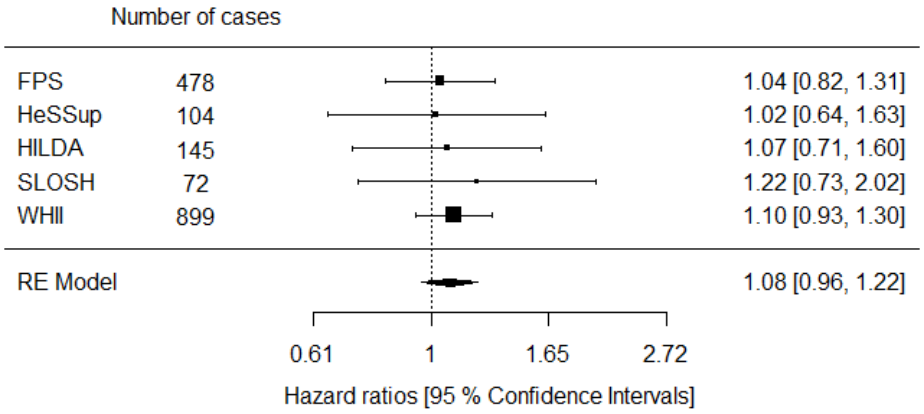
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

Supplementary Figures –results from the fully adjusted models analyzing the association between change in job strain and cardiometabolic disease in sensitivity analyses including people with poor mental health T1 but adjusting for poor mental health T1



Supplementary Figure 15. Results from Cox regression analyses assessing relationship between *increase in job strain* between T1 and T2 and incident cardiometabolic disease, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking and poor mental health

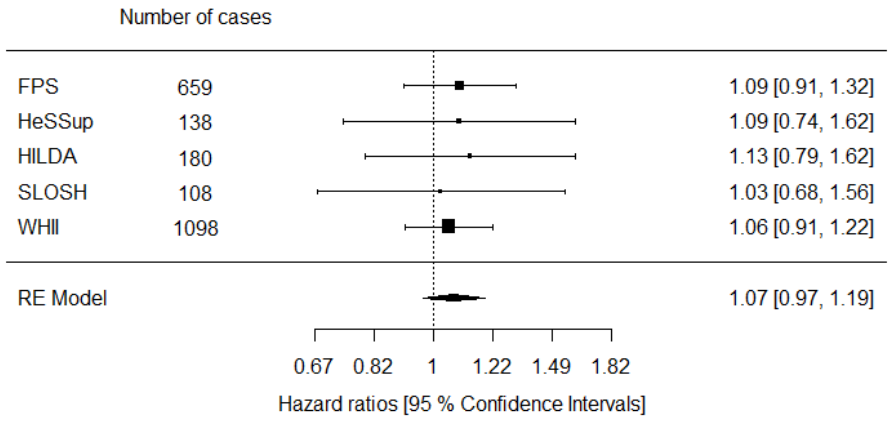
FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)



Supplementary Figure 16. Results from Cox regression analyses assessing relationship between *decrease in job strain* between T1 and T2 and incident cardiometabolic disease, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, and smoking

FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study, RE=random effect (pooled estimate across cohorts)

Supplementary Figure –results from the fully adjusted models analyzing the association between change in job strain and cardiometabolic disease in sensitivity analyses including people with poor mental health T1 but adjusting for poor mental health T1



Supplementary Figure 17. Results from Cox regression analyses assessing relationship between *decrease in job strain* between T1 and T2 and incident cardiometabolic disease, adjusting for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking and poor mental health

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Supplementary Table –results from the fully adjusted models analyzing the direct effect of an increase in job strain on cardiometabolic disease and indirect effect via poor mental health

Supplementary Table 1. Results from the mediation analyses assessing to what extent the association between increase in job strain between T1 and T2 and incident cardiometabolic disease may be mediated by poor mental health, presented in Hazard Ratios (HRs) and 95 % Confidence Intervals (CI).

	Total effect		**Natural direct effect**		**Natural indirect effect through mediator**		**Proportion mediated**
	HR[a]	95% CI	HR[a]	95% CI	HR[a]	95% CI	
FPS	1.02	0.81-1.28	1.00	0.79-1.26	1.02	0.97-1.07	[b]
HeSSup	0.94	0.52-1.70	0.94	0.52-1.71	1.00	0.90-1.12	[b]
HILDA	0.67	0.40-1.14	0.68	0.40-1.16	0.99	0.95-1.02	[b]
SLOSH	1.78	1.06-2.99	1.79	1.06-3.02	0.99	0.95-1.04	0
WHII	1.00	0.85-1.17	0.99	0.84-1.16	1.01	0.99-1.03	[b]

[a] the analyses were adjusted for sex, age, occupational position, civil status, education, obesity, physical inactivity, risky drinking, smoking

[b] not reported when the total effect was not statistically significant

FPS=the Finnish Public Sector Study, HeSSup=the Health and Social Support study, HILDA=the Household, Income and Labour Dynamics in Australia, SLOSH=the Swedish Longitudinal Occupational Survey of Health, WHII=the Whitehall II study

Appendix

Cohort studies

The Finnish Public Sector (FPS) Study

The Finnish Public Sector Study was established in 1997/1998, and comprises all 151,901 employees with a ≥6 month job contract in any year from 1991/2000 to 2005 in 10 towns and 5 hospital districts in Finland. Survey data has been collected by repeated surveys at 4-year intervals on all 103,866 cohort members, who were at work in the participating organizations during the surveys in the years 1997/1998, 2000/2001, 2004/2005, 2008/2009 and/or 2012/2013. Follow-up survey data of the respondents who had retired or left the organizations were collected in 2005, 2009 and 2013. Of those, 84,848 participants responded at least once (response rate 82 %). For the present study T1 data was derived from either the 1997 (67 % response rate), 2000-2002 (68 % response rate) or 2004 surveys (66 % response rate), and T2 data from subsequent wave 2000-2002, 2004 or 2008 (70-72 % response rate), about 3-4 years later). In total, 40298 participated in the T1 and T2 surveys, see more in Figure 1. The respondents were followed with regard to incident cardiometabolic disease until 2011.

The Health and Social Support (HeSSup) study

The Health and Social Support study is a prospective cohort study of a stratified random sample of the Finnish population. Participants in the age groups, 20-24, 30-34,

40-44, and 50-54 years of age, were identified from the Finnish population register and asked to respond to a questionnaire in 1998. In total, 25,898 (40% of all invited) individuals responded to the baseline questionnaire. An additional data collection was made 2003 with 19629 (80% of all eligible) respondents. For the present study, T1 and T2 data was derived from 1998 and 2003 surveys, about 5 years apart. In total, 8807 participated in the T1 and T2 survey and reported being at work in both surveys, see more in Figure 1. The respondents were followed with regard to incident cardiometabolic disease until 2012.

The Household, Income and Labour Dynamics in Australia (HILDA) survey

The Household, Income and Labour Dynamics in Australia survey from Australia has an annual panel design and use a combination of face-to-face interviews with trained interviewers and a self-completion questionnaire. The initial wave 2001 began with a large national probability sample of Australian households occupying private dwellings, with 13968 (66 %) respondents. Interviews were later conducted with all persons in sample households who turned 15 years of age. Since 2001, the response rates are above 90 % for respondents who have continued in the survey. For the present study, T1 data was derived from 2006 and T2 data from 2007, with a time lag of 1 year. In total, 11822 participated in the T1 and T2 surveys, see more in Figure 1. Previous and prevalent cardiometabolic disease was excluded up to 2007, and measured again in 2009 and 2013.

The Swedish Longitudinal Occupational Survey of Health (SLOSH)

The Swedish Longitudinal Occupational Survey of Health (*SLOSH*) is a longitudinal follow-up study of respondents to the biennial cross-sectional Swedish Work Environment Survey (SWES), which in turn targets a random stratified sample of gainfully employed Swedish residents aged 16–64 years. The first wave of the Swedish Longitudinal Occupational Survey of Health in 2006 comprised all respondents from SWES 2003. At wave 2 in 2008, the sample was increased by adding the respondents from SWES 2005. This resulted in a total sample of 18,917 persons originally representative of the working population in Sweden in 2003 and 2005, who have been resurveyed biannually. For the present study, we used data with two years between measurements. T1 data was derived from the 2006 or 2008 survey and T2 data from 2008 and 2010. Overall, 5985 (65%) and 11441 (61%) participants responded to the 2006 and 2008 surveys, while 9132 (57 %) responded to the 2010 survey. In total, 8009 participated in the T1 and T2 surveys, see more in Figure 1. The follow-up with regard to cardiometabolic disease ranged to 2013.

The Whitehall II (WHII) study

The Whitehall II study is a prospective cohort of British civil servants established in 1985-88. In total, 10308 individuals (6895 men and 3413 women) aged 35-55 years participated in the initial data collection, representing 73 % of the invited employees. Since then, follow-up surveys have taken place approximately every 2 to 3 years with response proportions ranging between 61-79 %. For the present study, T1 data was derived from phase 1 (1985-88) and T2 data from phase 2 (1989-90), with a time lag

of 1-5 years. In total, 9122 participated in the T1 and T2 surveys, see more in Figure 1. The follow-up of cardiometabolic disease ranged until phase 9 (2007-2009).

All cohort studies have been approved by regional ethics board and participants have given informed consent to participate in the studies.