proportion of time spent at work between periods of three years before and three years after rehabilitation among the intervention and control group and the difference in these differences (DID).

Results Among those with 105+days of work disability in the preceding three-year period, vocational rehabilitation resulted in significant percentage point gains in work participation, with the total DID across the disease groups and genders being 9.2 (95% confidence interval 7.3–11.1). The gains tended to actualise immediately after rehabilitation. No gains were observed among those with shorter preceding work disability.

Conclusions Vocational rehabilitation after musculoskeletal- and mental-related work disability showed only shorter-term effectiveness on work participation and only among those with longer work disability histories. The effectiveness of alternative and complementary interventions to vocational rehabilitation should be investigated.

08D.5 PHYSICAL ACTIVITY AS A MODERATOR OF EFFORT-REWARD IMBALANCE OVER TIME – RESULTS OF THE GERMAN LIDA-COHORT STUDY

Jean-Baptist du Prel*, Daniela Borchart. *University of Wuppertal, Department of Occupational Health Science, Wuppertal, Germany*

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Background Work-related stress is widespread in modern societies and an important risk factor for common health impairments. The model of effort-reward imbalance (=ERI), one of the best-investigated occupational stress models, is associated with musculoskeletal and coronary heart diseases as well as depressive disorders. A common assumption is that physical activity (PA) antagonizes the harmful effects of distress on health. Yet, the evidence of the effect of PA on work-related stress, especially on ERI, is limited so far. The aim of this investigation was to analyze the effect of PA on ERI over time.

Methods Work-related stress was measured by ERI and physical activity by a single question asking for the weekly frequency of physical activity leading to sweating or getting out of breath over two study waves (t1, t2). Multiple linear regression analysis adjusting for sociodemographic factors (age, sex, education) was performed including interaction testing.

Results Work-related stress at t1 was a significant predictor for work-related stress at t2. Physical activity at t2 - itself not significantly associated with work-related stress - had a significant moderating effect on work-related stress over two study waves. The higher the frequency of PA was, the lower the stress level at t2 in comparison to t1. This interaction of physical activity with ERI was also observable after adjustment for sociodemographic factors.

Discussion We found a moderating effect of physical activity on ERI over time in agreement with former studies using other measures of work-related stress. A dose-response relationship of physical activity and ERI over two study waves was observable in our study. Regarding the detrimental effect of chronic stress on health, PA might be beneficial by mitigating the health hazards of ERI and their long-term consequences (e.g., loss of work force). Longitudinal studies over more than two waves have to prove our findings.

08D.6 HIGH PHYSICAL WORKLOAD AND DISABILITY PENSION: A FOLLOW-UP STUDY OF SWEDISH MEN UNTIL 59 YEARS OF AGE

^{1,2}Katarina Kjellberg*, ³Daniel Falkstedt, ^{1,2}Anette Linnarsjö, ^{1,4}Tomas Hemmingsson.
¹*Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden;* ²*Centre for Occupational and Environmental Medicine, Stockholm County Council, Stockholm, Sweden;* ³*Department of Public Health Sciences, Karolinska Institutet, Stockholm, Sweden;* ⁴*Department of Public Health Sciences, Stockholm University, Stockholm, Sweden*

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Background In Sweden, the proportion of the population that remains in paid employment until normal retirement age of 65 years is less than 50% in blue-collar groups, compared to 60%–75% in white-collar occupations. High physical workload has been associated with early exits from the labor market through disability pensions (DP) in many studies. However, identified risk factors for DP from early life may be more prevalent among men in heavy manual occupations than in others. The aim was to investigate the association between high physical work load in middle age and DP before age 59, adjusting for social background, physical ability, psychological characteristics, lifestyle and education measured before labour market entrance.

Methods The study is based on a Swedish conscription cohort of 49 321 men born 1949–1951. At enlistment 1969/1970 information was collected about cardiorespiratory fitness, social background, psychological characteristics and health behaviours, e.g. smoking. Physical workload was estimated with a job exposure matrix based on questions concerning heavy lifting, strenuous work postures, repetitive work and physically strenuous work from the Swedish Work Environment Surveys 1989–97. Mean values for men of a composite physical exposure variable were grouped into quartiles; high, medium-high, medium-low and low physical workload, and assigned to occupational titles from the census 1990. The study group was followed regarding DP from age 40 to 59.

Results Exposure to high (HR 2.67, CI 95% 2.42–2.95), medium-high (HR 2.43, CI 95% 2.20–2.69) and medium-low (HR 1.31, CI 95% 1.18–1.47) physical workload, compared with low, were associated with DP up to age 59. The increased risks remained, but were clearly attenuated after adjustments for pre-labour market factors, especially psychological characteristics and education.

Conclusion The results are in line with a major effect of high physical work load on disability pension, even though adjustments for pre-labour market factors clearly attenuated the risks.

08D.7 THE EFFECT OF RIGHT TRUNCATION BIAS ON BIOMECHANICAL FACTOR RISK ESTIMATES FOR CTS

¹Carisa Harris-Adamson, ²Ellen Eisen, ¹David Rempel*, ³Fred Gerr, ⁶Stephen Bao, ⁴Kurt Hegmann, ⁵Jay Kapellusch, ⁷Alysha Meyers. ¹*University of California, San Francisco, San Francisco, USA;* ²*University of California, Berkeley, Berkeley, USA;* ³*University of Iowa, Iowa City, USA;* ⁴*University of Utah, Salt Lake City, USA;* ⁵*University of Wisconsin, Milwaukee, USA;* ⁶*Department of Labor and Industries, Olympia, USA;* ⁷*National Institute for Occupational Safety and Health, Cincinnati, USA*

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Carpal tunnel syndrome (CTS) is a potentially disabling occupational illness with high incidence rates in certain occupations. Prospective workplace studies have identified

associations between personal, psychosocial and biomechanical factors and incident CTS. However, biased estimates of association due to the healthy worker survivor effect (HWSE) have not been fully investigated. The HWSE results in left truncation bias when affected workers are lost from the population of more highly exposed workers before study participants are sampled. Right truncation bias occurs when affected workers are lost disproportionately from higher exposure strata after enrollment in a prospective cohort study. This study evaluated the effects of right truncation bias on risk estimates for biomechanical factors.

Between 2001 and 2010 five research groups in the US conducted coordinated prospective studies of incident CTS among workers from various industries. Hazard ratios (HR) were estimated using Cox proportional regression analyses with adjustment for personal and workplace psychosocial factors. Inverse probability censoring weight (IPCW) values were created using a cross-validated approach analogous to the lasso method for variable selection and parameter regularization. The weighting model predicted the probability of exit from the cohort in the next 3 months.

The final models included 2520 workers and 166 incident CTS cases. IPCW models with adjustment for right truncation bias were used to predict incident CTS. Effect size estimates for the workplace biomechanical factors of Peak Force, HAL Scale, Forceful Repetition Rate and the ACGIH TLV for HAL increased by 11% to 71% in comparison to models without adjustment for right truncation bias. After adjusting for right truncation bias the predicted incidence of CTS in highly exposed workers increased up to 3-fold.

Bias from symptomatic workers disproportionately leaving the workplace was identified in this cohort. Adjusting for this bias has likely produced more accurate dose-response relationships than those previously reported.

08D.8 SEVERITY OF CARPAL TUNNEL SYNDROME AND MANUAL WORK: FINDINGS FROM A CASE-CONTROL STUDY

¹Mauro Mondelli, ²Stefania Curti, ²Andrea Farioli, ¹Alessandro Aretini, ³Federica Ginanneschi, ⁴Giuseppe Greco, ²Antonio Argentino, ²Caterina Salce, ²Stefano Mattioli*. ¹EMG Service, Health District no.7, Siena, Italy; ²University of Bologna, Bologna, Italy; ³Department of Medical, Surgical and Neurosciences, University of Siena, Siena, Italy; ⁴EMG Service, Health District no.7, 'Nottola' Hospital, Montepulciano, Italy

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Objective Carpal tunnel syndrome (CTS) is a socially relevant condition. This case-control study aims to investigate the association between CTS severity and manual work considering personal anthropometric risk factors as well.

Methods We consecutively enrolled one CTS case for two controls (subjects without clinical and electrophysiological CTS signs) regardless of age and gender who were admitted to the same three outpatient electromyography labs.

CTS cases were grouped in three classes of progressive clinical and electrophysiological severity according to two validated five-stage scales. Anthropometric measures and occupational history were collected. Job titles were coded according to the International Standard Classification of Occupations (ISCO 88) by two occupational physicians who were blind to case/control status. Job titles were grouped in two main occupational categories: manual workers and non-manual workers.

To assess the association between CTS severity and manual work, ordered logistic regression models (adjusted for age, sex, wrist-palm ratio and waist-stature ratio) were performed. Odds ratios (OR) and 95% confidence intervals (95% CI) were calculated.

Results This case-control study enrolled 370 cases and 747 controls. After the exclusion of retired subjects, subjects older than 65 years and subjects with no information about occupational history, we included 183 cases and 445 controls in the main analysis.

For manual workers with respect to non-manual workers, the OR for the electrophysiological severity scale was 2.4 (95%CI 1.5–3.7). Regarding the clinical severity scale, the OR for manual workers compared to non-manual workers were 2.3 (95%CI 1.5–3.7).

Conclusion This study confirms that manual work is an important risk factor for CTS. The association between manual work and CTS severity tends to increase from mild to severe stage of both electrophysiological and clinical scale.

P.1.01 A NATIONWIDE, LONGITUDINAL STUDY OF CROHN'S DISEASE AMONG KOREAN WORKERS EXPOSED TO TOLUENE

¹Yeon-soon Ahn*, ²Jin-Ha Yoon, ¹Jeong-Ha Lee. ¹Yonsei Wonju College of Medicine, Wonju, South Korea; ²Yonsei College of Medicine, Seoul, South Korea

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The pathogenesis of inflammatory bowel diseases (IBD) probably involves an interaction between genetic and environmental factors. Recent studies have shown that air pollution and PFOA (perfluorooctanoic acid) are associated with IBD. It is presumed to be related to inflammatory response. Immunoreactivity and inflammatory response are known to be major important mechanisms that causes toluene induced toxicity. So we evaluated the Crohn's disease morbidity among Korean workers exposed to toluene.

Methods Data were collected from toluene-associated specialized medical check-up 2000 and 2004 in Korea. The number of workers admitted to hospital because of clinically diagnosed Crohn's disease was analyzed in male workers exposed to toluene (n=149,183). As a control reference population, 2% of Korean men were randomly selected and their hospital admission data were analyzed. For toluene exposed workers, Standardized admission ratios (SARs) for Crohn's disease, as determined by ICD-10 classifications, were estimated in reference to the control population.

Results During follow up, 46 workers admitted because of Crohn's diseases. Occupational exposure to toluene (5 63 852 person-years) was significantly associated with the SAR of Crohn's disease (SAR: 1.60, 95% CI: 1.17–2.13), in particular, SARs of workers with 3rd quartile hippuric acid level was significantly increased (SAR: 1.95, 95% CI: 1.21–2.99).

Conclusion In conclusion, toluene-exposed workers exhibited significantly elevated SARs for Crohn's disease, especially workers with high level of hippuric acid, compared to the age-matched reference population, suggesting a relatedness with toluene exposure. This work was supported by Korea Environmental Industry and Technology Institute (KEITI) through 'The Chemical Accident Prevention Technology Development Project' funded by Korea Ministry of Environment (MOE) (2017001970001).