

# Epidemiological aspects of musculoskeletal pain in the upper body

## Analyzing common and recurrent binary outcomes

Akademisk avhandling

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Av  
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This thesis is based on the following papers:

- I Ekman\*, A., Andersson, A., Hagberg, M., Hjelm, E. W. (2000) Gender differences in musculoskeletal health of computer and mouse users in the Swedish workforce. *Occupational Medicine*, 50:608–13
- II Grimby-Ekman, A., Andersson, E. M., Hagberg, M. (2009) Analyzing musculoskeletal neck pain, measured as present pain and periods of pain, with three different regression models: a cohort study. *BMC Musculoskeletal Disorders*, 10:73
- III Grimby-Ekman, A., Hagberg, M. The validity of asking about the presence of musculoskeletal neck pain in epidemiological questionnaires. *Manuscript*
- IV Grimby-Ekman, A., Andersson, E. M., Hagberg, M., Neck pain and perceived stress. Analyzing longitudinal binary outcome in a cohort study. *Manuscript*

\* Change of author's last name, from Ekman to Grimby-Ekman.

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# **Epidemiological aspects of musculoskeletal pain in the upper body**

## **Analyzing common and recurrent binary outcomes**

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### **Abstract**

The overall aim of this thesis is to gain epidemiological knowledge about musculoskeletal pain in the upper body in light physical work, in relation to gender, psychosocial factors, and computer use; and to compare different methods for analyzing common and recurrent binary outcomes. Two study groups were investigated using questionnaire data: (a) computer users in the Swedish workforce and (b) a cohort of university students. Regression models used were ordinary logistic model, Cox model (for calculating prevalence ratios), marginal logistic model (GEE), random intercept logistic model (GLMM), Markov logistic model and Poisson model. Effect measures used were odds ratio, risk ratio and risk difference.

Musculoskeletal pain in the upper body was more prevalent among women than among men, even among young adults. Risk factors among computer users in the workforce were high work demands, and using the computer most of the work-day (women). Protective factors were work control and to learn and develop at work, and for women support from superiors. In the university cohort stress, high work/study demands and computer use break pattern were identified as risk factors for neck pain. Stress was a risk factor associated both with developing and ongoing neck pain, and had an impact on both the group-average risk and the subject-specific risk of neck pain. Computer use break pattern had an impact on the group-average risk for neck pain, but on the subject-specific risk only for women. Among women stress and computer use break pattern interacted. The effect of presence of both factors exceeded the additive effect of each. Simple questions, about present neck pain and neck pain period past year, captured features of pain, such as general health, sleep disturbance, stress, and general performance. Neck pain period past year did not reflect more serious pain compared to present neck pain. The choice of statistical model should be based on whether a group-average risk or a subject-specific risk is of clinical relevance. Women and men differed more in the absolute effect measures than in the relative, regarding neck pain. The causality between risk factors and neck pain may differ between women and men.

**Keywords:** musculoskeletal, pain, neck, repeated measurements, logistic model, odds ratio, risk ratio, risk difference, biological interaction

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