

Epidemiological aspects of health and work ability in the Swedish workforce

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien,
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av Adnan Noor Baloch

Fakultetsopponent:
Docent Emilie Friberg
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Avhandlingen baseras på följande delarbeten

- I. Noor Baloch, A., Hagberg, M., Thomée, S., Steineck, G., Sandén, H. Disability pension among gynaecological cancer survivors with or without radiation-induced survivorship syndromes. *J Cancer Survivorship* 16, 834–843 (2022)
- II. Noor Baloch, A, Hagberg, M, Thomée, S, Steineck, G, Sandén, H. The physical and psychological aspects of quality of life mediates the effect of radiation-induced urgency syndrome on disability pension in gynecological cancer survivors. *Cancer Medicine*. 2023; 12: 17377–17388
- III. van Schaaijk A, Noor Baloch A, Thomée S, Frings-Dresen M, Hagberg M, Nieuwenhuijsen K. Mediating Factors for the Relationship between Stress and Work Ability over Time in Young Adults. *Int. J. Environ. Res. Public Health*. 2020, 17(7), 2530
- IV. Noor Baloch, A, Sandén, H, Hagberg, M, Adiels, M. Comparable performance of logistic regression and machine learning techniques in predicting disability pension among workers with musculoskeletal symptom. Manuscript

**SAHLGRENSKA AKADEMIN
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Abstract

Background: Many working-age individuals suffer from health issues, impacting their work ability and potentially leading to early workforce exit. More understanding of individual and occupational factors influencing work ability and the use of machine learning techniques in occupational health research is needed.

Aim: This thesis aims to describe and investigate the effect of health and work environment factors on work ability. In addition, it seeks to compare different statistical and machine learning methods for predicting work ability among workers by using demographic and work environment data.

Methods: Study I and II used data from 247 working-age gynecological cancer survivors to study *if* and *how* gastrointestinal syndromes influence the likelihood of disability pension. Study I utilized log-binomial regression, and Study II used counterfactual-based mediation analysis methods. Study III used multiple mediation analysis to investigate stress's long-term impact on work ability among 1432 young adults. Study IV compared the predictive performance of logistic regression with machine learning techniques among 6302 workers with musculoskeletal symptoms.

Results. In Study I, an increased risk of disability pension was found for survivors with radiation-induced gastrointestinal syndrome. However, Study II showed that this increased risk is mediated via different aspects of self-assessed quality of life, including global physical health, physical strength, psychological well-being, and satisfaction with sleep. Study III indicated that the association between perceived stress (at baseline) and work ability among young adults was mediated by stress five years later, feelings of control over one's personal life, work demands affecting personal life, and feeling well-rested upon waking. In Study IV, all machine learning techniques exhibited strong performance, with Extreme Gradient Boosting, AdaBoost, and Gradient Boosting Machines performing best. The calibration varied across techniques.

Conclusion: There exists a complex relationship between health and work ability. Radiation-induced gastrointestinal syndrome influences the self-reported quality of life and disability pension, where quality of life mediates part of the gastrointestinal syndrome's effect on disability pension. Occupational factors mediate the impact of perceived stress on work ability in young adults. Also, feelings of control over personal life are important for maintaining work ability in young adults with stress complaints. The performance of multivariable logistic regression, which utilizes clinically relevant predictors, is comparable to that of sophisticated machine learning algorithms when it comes to predicting disability pensions.

Keywords: Work ability, female cancer survivors, young adults, epidemiology, disability pension, work environment, musculoskeletal symptoms, stress, machine learning.