INTERACTION BETWEEN PHYSICAL AND PSYCHOSOCIAL WORK RISK FACTORS FOR LOW BACK SYMPTOMS

A study of:
Prevalence, risk factors, and interaction between physical and psychosocial work risk factors for low back symptoms and its consequences (reduced activities and absenteeism) in a random sample of workers in New Zealand and in Indonesian coal mining workers

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Abstract

The prevalence of low back symptoms (LBS) in developed and industrially developing countries (IDCs) is high, and there have only been a few studies in New Zealand and IDCs. It is well known that the risk factors for LBS include physical and psychosocial exposures, but the interaction between these is not well understood. Even less is known about prevalence of, and risk factors for, twopossible consequences of LBS (reduced activities and absenteeism). Hence, this thesis examines the prevalence, risk factors, and the interaction between physical and psychosocial work risk factors for LBS and its consequences in a developed country and an IDC. This was done in two cross-sectional studies of: A) a large random sample of workers in New Zealand, and; B) Indonesian coal mining workers.

In telephone interviews of 3,003 participants (1,431 males and 1,572 females) aged 20-64 randomly selected from the New Zealand Electoral Roll, the 12-month period prevalence of LBS, reduced activities, and absenteeism due to LBS were 54%, 18%, and 9%, respectively. Risk factors of LBS for the whole population (males and females) increased with work in awkward or tiring positions and stressful jobs. Awkward or tiring positions at work, dissatisfaction with contact and cooperation with management, and stressful jobs were risk factors for women but not for men. The only risk factor for reduced activities was lifting. Risk factors for absenteeism were working in awkward or tiring positions and in a cold or damp environment.

In a self-administered questionnaire among 1,294 Indonesian coal mining workers (1,252 males and 42 females), the 12-month period prevalence of LBS, reduced activities, and absenteeism due to LBS were 75%, 16%, and 13%, respectively. This study afforded an opportunity to examine selection bias due to a healthy worker effect. It showed that blue-collar work (as opposed to white-collar work) was a risk factor for LBS, after adjustment for a healthy worker effect and other potential confounders. The presence of LBS and smoking increased the risk of reduced activities and absenteeism. This study also indicated that those who were exposed to both high physical (awkward posture, whole-body vibration, using vibrating hand

tools, and lifting) and high psychosocial (high effort, low reward, job dissatisfaction, and work stress) factors were most likely to report LBS and both consequences. High psychosocial exposure increased the likelihood of reporting LBS, but high physical exposure did so for reduced activities and absenteeism. Current smokers were more likely to report LBS consequences than nonsmokers. Permanent employment and night shift work increased the risk of LBS and its consequences. There was an interaction between physical and psychosocial exposures for LBS. The overall risk for LBS was greater than the sum of the individual risks due to physical and psychosocial factors (as indicated by departure from an additive model of risk). Thirty-nine percent of LBS cases among those who were exposed to high physical and high psychosocial risk factors were due to exposure to both factors. There were also interactions between the risk factors for reduced activities due to LBS, although not significant, whereas for absenteeism due to LBS it was not present.

The implications of these findings for New Zealand workers are that LBS and its consequences could be reduced by using interventions designed to avoid or minimise exposure to physical and psychosocial work factors. In addition, environmental factors should also be improved in order to reduce the consequences of LBS. For Indonesian coal mining workers, addressing both physical and psychosocial factors in the workplace is likely to reduce up to 39% of LBS cases among workers exposed to both factors. This will in turn, reduce the risk of LBS consequences. The intervention strategy should also focus on permanent employment, night shift work, and smokers.

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List of publications from thesis

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Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S. & Pearce, N. (2012). Gender differences in work-related risk factors associated with low back symptoms. *Ergonomics*, 55(3), 327-342.

Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S. & Pearce, N. (2012). Prevalence and work-related risk factors for reduced activities and absenteeism due to low back symptoms. *Applied Ergonomics*, 43(4), 727-737.

Widanarko, B., Legg, S., Stevenson, M., Devereux, J., & Jones, G. (2012). Prevalence of low back symptoms and its consequences in relation to occupational group. *American Journal of Industrial Medicine.* doi: 10.1002/ajim.22116.

Widanarko, B., Legg, S., Devereux, J., & Stevenson, M. (2012). Interaction between physical and psychosocial work risk factors for low back symptoms and its consequences amongst Indonesian coal mining workers. *Manuscript submitted for publication.*

Widanarko, B., Legg, S., Stevenson, M., & Devereux, J. (2012). Interaction between physical, psychosocial, and organisational work factors for low back symptoms and its consequences amongst Indonesian coal mining workers. *Work: A Journal of Prevention, Assessment and Rehabilitation, 41*(Supplement 1), 6112-6119.

Conference papers:

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Widanarko, B., Legg, S., Stevenson, M., Devereux, J., Eng, A., 't Mannetje, A., Cheng, S., Douwes, J., Ellison-Loschmann, L., Mclean, D. & Pearce, N. (2010). Work-related risk factors associated with musculoskeletal symptoms among New Zealand workers. *In* Olsen, K.B. & Tappin, D. eds. *New Zealand Ergonomics Society's 16th Conference: Preventing Work-Related Musculoskeletal Disorders: Present and Future Challenges* (pp. 27-32). Nelson, New Zealand: New Zealand Ergonomics Society Inc. ISBN: 0-9582560-4-7
Presented (oral) in the 16th New Zealand Ergonomics Society Conference, 18-19 November 2010. Nelson, New Zealand.

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Presented (oral) in the 15th New Zealand Ergonomics Society Conference, 27-28 May 2009. Martinborough, New Zealand.

Nonrefereed conference papers:

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Presented (oral) in Occupational Health Symposium 2012 – Health and the environment at work: The need for solutions, 2-3 April 2012. Wellington, New Zealand. Centre for Public Health Research, Massey University.

Widanarko, B., Legg, S. J., Devereux, J. (2009). Interactions between physical and psychosocial risk factors in association with low back pain among coal mining workers.
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Best student paper at the 16th New Zealand Ergonomics Society Conference:

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Details of this paper has been described in Conference papers, Refereed papers section above.

Note.

This thesis follows the American Psychological Association (APA) sixth edition (APA, 2010) style.

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SECTION A

List of abbreviations

ACC	Accident Compensation Corporation
AP	attributable proportion
APA	American Psychological Association
AUC	area under the ROC curve
BMI	body mass index
CI	confidence interval
COPSOQ	Copenhagen Psychosocial Questionnaire
ERI	effort reward imbalance
EUR	euro
JCQ	Job Content Questionnaire
IDCs	industrially developing countries
IOM	Institute of Medicine
IRR	incidence rate ratio
kg	kilogram
LBD	low back disorders
LBP	low back pain
LBS	low back symptoms
HR	hazard ratio
MSD	musculoskeletal disorders
MSS	musculoskeletal symptoms
NMQ	Nordic Musculoskeletal Questionnaire
NOHSAC	National Occupational Health and Safety Advisory Committee
NPV	negative predictive value
NRC	National Research Council
OR	odds ratio
PPV	positive predictive value
PR	prevalence ratio
ROC	Receiver Operating Characteristic
SE	standard error

SMEs	small-medium enterprises
UK	United Kingdom
US	United States
USD	United States dollar
VIF	variance inflation factor
WHO	World Health Organization
WMSD	work-related musculoskeletal disorders
WMSS	work-related musculoskeletal symptoms

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