

Effectiveness of participatory ergonomic interventions on health outcomes: A systematic review

Irina Rivilis^{a,b,*}, Dwayne Van Eerd^{a,1}, Kimberley Cullen^{a,2}, Donald C. Cole^{a,b,3},
Emma Irvin^{a,4}, Jonathan Tyson^{c,5}, Quenby Mahood^{a,6}

^a*Institute for Work & Health, 481 University Avenue, Suite 800, Toronto, Ontario, Canada, M5G 2E9*

^b*Department of Public Health Sciences, University of Toronto, Ontario, Canada*

^c*Pulp and Paper Health and Safety Association, P.O. Box 2050, Station Main 690 McKeown Avenue North Bay, Ontario, Canada, P1B 9P1*

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Abstract

The objective of this study was to conduct a systematic review of the literature on the effectiveness of participatory ergonomic (PE) interventions for improving workers' health. The search strategy targeted six electronic databases and identified 442 potential articles. Each article was examined by pairs of reviewers for relevance (assessed a participative ergonomic workplace intervention, with at least one health outcome, published in English in peer reviewed literature). Twenty-three articles met relevance criteria and were then appraised for methodological strength. Using a best evidence synthesis approach, 12 studies that were rated as 'medium' or higher provided partial to moderate evidence that PE interventions have a positive impact on: musculoskeletal symptoms, reducing injuries and workers' compensation claims, and a reduction in lost days from work or sickness absence. However, the magnitude of the effect requires more precise definition.

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1. Introduction

1.1. Participatory ergonomics

Participatory ergonomic (PE) interventions or programmes are often used to reduce work related musculoskeletal disorders (MSD) in workplaces (Hagberg et al., 1995;

National Research Council, 2001). They grew out of quality circle experiences in Japan (Nagamachi, 1995) and participatory workplace design processes in Northern Europe (Elden, 1986) and North America (Liker et al., 1995) during the 1980s. Unions (Bryson, 2004; Canadian Auto Workers, 2004), health and safety sectoral agencies (Archer and Courville, 1998), and health and safety associations (Occupational Health & Safety Agency for Healthcare in British Columbia, 2005) have actively promoted PE approaches. Wells et al. (2004) and researchers from the Centre for Research Expertise on the prevention of Musculoskeletal Disorders and Disability (CRE-MSD) in Canada have advocated the use of a blueprint specifically developed to guide PE interventions. In addition, multi-stakeholder initiatives have promoted PE approaches as in the recent Occupational Health and Safety Council of Ontario proposal to explore ergonomic strategies to reduce the number of MSD claims submitted by Ontario workers (Pulp and Paper Health and Safety Association, 2004).

*Corresponding author. Institute for Work & Health, 481 University Avenue, Suite 800, Toronto, Ontario, Canada, M5G 2E9.

Tel.: +416 927 2027x2127; fax: +416 927 4167.

E-mail addresses: irivilis@iwh.on.ca (I. Rivilis), dvaneerd@iwh.on.ca (D. Van Eerd), kcullen@iwh.on.ca (K. Cullen), dcole@iwh.on.ca (D.C. Cole), eirvin@iwh.on.ca (E. Irvin), jtyson@pphsa.on.ca (J. Tyson), qmahood@iwh.on.ca (Q. Mahood).

¹Tel.: +416 927 2027x2138; fax: +416 927 4167.

²Tel.: +416 927 2027x2128; fax: +416 927 4167.

³Tel.: +416 927 2027x2166; fax: +416 927 4167.

⁴Tel.: +416 927 2027x2109; fax: +416 927 4167.

⁵Tel.: +705 474 7233x236; fax: +705 472 8250.

⁶Tel.: +416 927 2027x2112; fax: +416 927 4167.

Wilson and Haines (1997) defined PE as ‘the involvement of people in planning and controlling a significant amount of their own work activities, with sufficient knowledge and power to influence both processes and outcomes in order to achieve desirable goals’. Kuorinka (1997) defined PE as ‘practical ergonomics with participation of the necessary actors in problem solving’. A characteristic feature of PE is the formation of an ergonomics ‘team’ typically made up of employees or their representatives, managers, ergonomists, health and safety personnel, and research experts. Once formed, teams typically undergo training by an expert (usually an ergonomist) to become familiar with ergonomic principles (Wells et al., 2004). With a foundation of ergonomic concepts and methods in place, the group uses its newly developed knowledge to make improvements in their workplace (Haims and Carayon, 1998; Halpern and Dawson, 1997; Reynolds et al., 1994; Noro and Imada, 1991). By working together to improve workplace conditions through participation, communication, and group problem solving, a PE intervention can positively impact on workers’ health (Haims and Carayon, 1998; Haines et al., 2002; Laitinen et al., 1997a, b; Nagamachi, 1995; Simon and Leik, 1999). Ideally, the PE approach encourages workers to be involved in controlling their own work activities, consequently decreasing work organization or psychosocial risk factors (Bongers et al., 2002; Westgaard, 1999; Wilson and Haines, 1997).

1.2. Evaluations of participatory ergonomics

In the scientific literature, evaluation studies often focus on particular aspects of PE. We can conceive of a number of steps along a pathway by which PE might improve both employee health and productivity (see Fig. 1).

Process evaluation of PE implementation is important for understanding how changes are brought about. Qualitative and quantitative literature on PE processes examining the implementation of PE interventions is available (Kuorinka et al., 1994; Rice et al., 2002). Similarly a literature exists on the effectiveness of PE in reducing exposures or risk factors for MSD i.e., *exposure*

change evaluations. For example, a randomized controlled trial by Straker and colleagues (2004) demonstrated reductions in a variety of important indicators of biomechanical exposure. Such changes in exposure are important to overall judgments of the effectiveness of PE (Cole et al., 2003). Adequate details about PE processes and biomechanical exposure reduction are needed to better evaluate improvements in health outcomes (Cole et al., 2003). A nascent formal *economic evaluation* literature on the efficiency of workplace interventions in achieving changes in both employee health and production outcomes is also developing (Dul, 2004). Economic evaluations may address the relative cost–benefit of implementing PE in different kinds of workplaces.

1.3. Reviews of participatory ergonomics

Important narrative reviews have reflected upon implementing and evaluating PE interventions (Haims and Carayon, 1998; Haines et al., 2002; Haslam, 2002; Hignett et al., 2005; St-Vincent et al., 2000). The prerequisites and benefits of implementing successful PE programs have also been described (Nagamachi, 1995; Wilson and Haines, 1997). Hignett’s narrative review provided an excellent summary of the strengths of PE with examples from a range of industries, including health care, military, manufacturing, production and processing, services, construction and transport. However, we could not find a systematic evaluation of the quality, quantity and consistency of evidence of effectiveness of PE in improving health outcomes, similar to Hignett’s (2003) examination of strategies to reduce patient handling MSD.

1.4. Objectives of this review

We therefore sought to conduct a systematic literature review to assess the quality of available scientific evidence with two objectives: (1) to synthesize evidence on the effectiveness of workplace-based PE interventions in improving health outcomes, in order to assist practitioners and policy makers; and (2) to provide an assessment of the methodological strengths and weaknesses which characterize the studies of PE interventions with health outcome

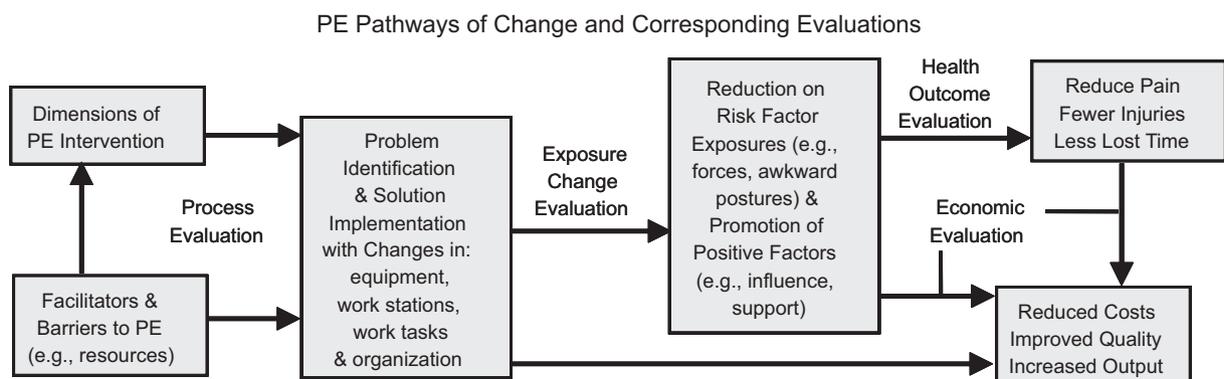


Fig. 1. Participatory ergonomics pathways of change and corresponding evaluations.

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