

Review

Exercise is more than medicine: The working age population's well-being and productivity

Gisela Sjøgaard*, Jeanette Reffstrup Christensen, Just Bendix Justesen, Mike Murray, Tina Dalager, Gitte Hansen Fredslund, Karen Søgaard

Department of Sports Science and Clinical Biomechanics, Research Unit of Physical Activity and Health in Work Life, University of Southern Denmark, Odense M DK 5230, Denmark

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Abstract

Background: Physical activity (PA) includes muscle activity during exercise, manual work, and leisure time activities including sport. Conflicting results exist regarding health effects of PA that may deteriorate with manual work and elite sports, but improve when performed in moderation in accordance with international guidelines and may additionally enhance well-being and productivity.

Methods: In Denmark 15 randomized controlled trials have been conducted, introducing exercise at the workplace enrolling >3500 workers. The interventions lasted from 10 to 52 weeks and offered ~1 h weekly supervised exercise during working hours according to the concept of intelligent physical exercise training (IPET) that is based on evidenced sports sciences training principles and tailored to work exposure, employee health status, and physical capacity. Questionnaire surveys and health checks including blood and muscle sampling were performed at baseline and follow-up. The job groups included: office and computer workers, dentists, industrial technicians, cleaning personnel, health care workers, construction workers, and fighter/helicopter pilots.

Results: In all job groups significant improvements were documented regarding health outcomes. These were job group specific: neck pain was reduced among office and computer workers, dentists, industrial laboratory technicians, health care workers as well as fighter pilots. Cardio-respiratory fitness—a health risk indicator for cardio-metabolic diseases—was improved among office and computer workers, health care workers, and construction workers. Additionally, other improvements were evidenced such as increased muscle strength and balance control. Importantly, productivity increased with improved muscle strength and decreased body mass index.

Conclusion: IPET does enhance health if an exercise program with evidenced efficacy is implemented by expert trainees with support of the employer. Accordingly, in every study group outcomes of improved health were documented and the effect sizes were of clinical relevance. Cost effectiveness estimates indicate acceptable cost relative to savings on health expenses and lost productivity.

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Keywords: Physical activity; Physical exercise training; Workplace health promotion

1. Introduction

Exercise is a specific subset of physical activity (PA) which for decades has been considered to provide health benefits irrespective of the site where PA is performed.^{1,2} However, taxonomy has changed during the past decades with definitions becoming more consistent: PA encompasses any muscle activity while physical exercise is bodily activity that develops and maintains physical fitness and overall health and wellness.

Thus, PA also includes, beside exercise, daily life activity at leisure as well as occupational activity (Fig. 1).³ These activities may be well performed in a manner that is health enhancing like physical exercise, if relevant muscle groups are involved, the intensity is sufficient, and recovery appropriate. However, in this context it is important to recognize that actually not all PA does correlate with good health. At the labor market a relevant proxy for poor health is sickness absenteeism and analysis on the Danish National Working Cohort during this decennium showed that sickness absenteeism decreased with increased leisure time PA but increased with increased occupational PA (Fig. 2).⁴ The present paper will focus on the working age population that accounts for the major fraction of adult humans.

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* Corresponding author.

E-mail address: gsjogaard@health.sdu.dk (G. Sjøgaard).

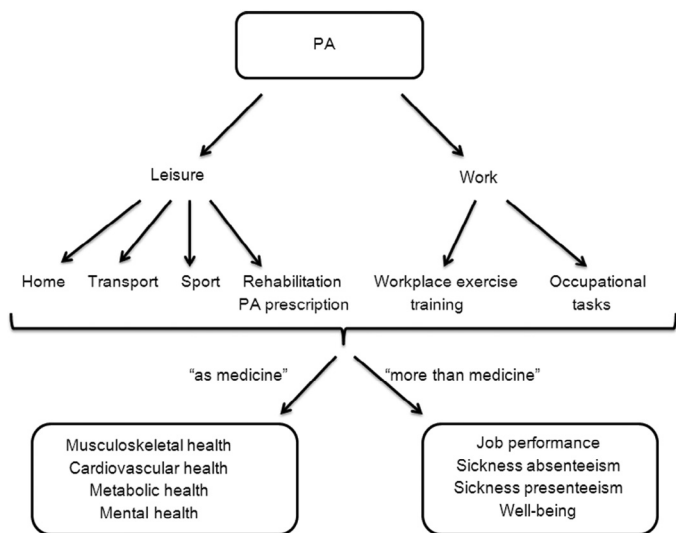


Fig. 1. Exercise is a specific subset of physical activity (PA) which for decades has been considered to provide health benefits irrespective of the site where it is performed.³

1.1. Exercise recommendations for health

In a recent review evidence was presented that “Exercise is Medicine” for 26 different chronic diseases.⁵ So in a clinical perspective the answer is a clear YES to the question: is exercise medicine? A large range of diseases—ranging from psychiatric diseases as depression to cancer, cardiovascular, metabolic, pulmonary, and musculoskeletal diseases—can be treated or relived by exercise. Interestingly, many different modes of exercise have been studied including, e.g., Tai Chi, which may be beneficial for improving osteoporosis.⁵ However, in general effectiveness of exercise was in particular related to exercise intensity during strength, as well as aerobic training in line with the recommendations by the World Health Organization (WHO):⁶ adults aged 18–64 should throughout the week do at least (1) 150 min of

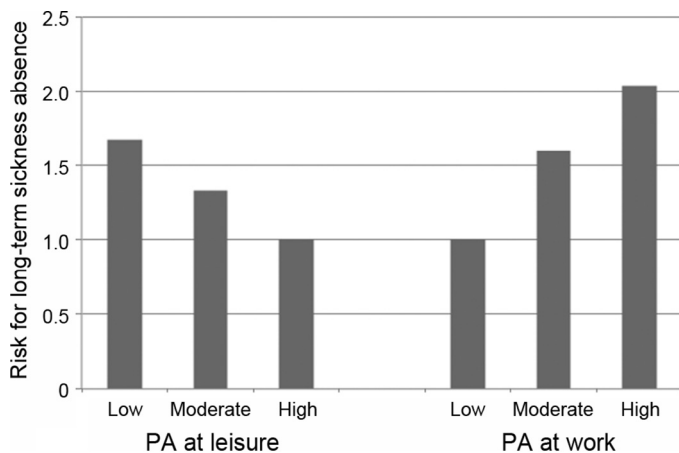


Fig. 2. The contrasting effect of the muscle activation pattern was demonstrated by analysis of physical activity (PA) levels in the Danish National Work Environment Cohort. Drawn based on recalculated data from Ref. 4.

moderate intensity aerobic PA or 75 min of vigorous intensity aerobic PA or an equivalent combination of moderate and vigorous intensity PA, (2) aerobic PA should be performed in bouts of at least 10 min duration, (3) for additional health benefits do more—up to twice, and (4) muscle-strengthening activities should be done on 2 or more days a week involving major muscle groups. These recommendations are in line with the position statement of the American College of Sports Medicine recommending to achieve a total energy expenditure of $\geq 500\text{--}1000$ MET·min per week and to perform strength and neuro-motor exercise involving balance, agility, and coordination.⁷

1.2. The workplace as arena for health enhancing exercise

The workplace has been suggested as a specially prioritized arena for health promotion; and commitment for workplace health promotion (WHP) has been implied as an almost ethical obligation, e.g., by WHO. PA may be an integral part of WHP, and WHP was shown to increase the health-related prognosis of work ability.⁸ Further, a comprehensive review reported that in an occupational context lack of exercise was a potential risk factor for sickness presenteeism, a relatively new variable attempting to assess the on-the-job-performance.⁹ Employees with the highest job strain have the highest risk of leisure time inactivity according to a meta-analysis,¹⁰ which is an argument for employers to introduce physical exercise training during working hours to maintain the work force at good health. In this context vigorous intensity is advised in order to perform as much as possible of the recommended training volume during working hours—time is money. Therefore, in an occupational setting the relevant question to pose would be: is exercise more than medicine? A positive answer is in particular important as an argument for the employer to allow exercise training during working hours. In such case evidence is important for the possible financial benefits from workplace exercise balancing the expenses in terms of the time allowances for such exercises and possibly salary for exercise instructors.

WHP may have the potential to reduce health risks that are precursors to chronic diseases,¹¹ and physical exercise training at the workplace may thus prevent lifestyle diseases such as cardiovascular, metabolic, and musculoskeletal disorders. However, conflicting results have been presented regarding the effectiveness of workplace physical exercise training on health promotion as well as for measures of on-the-job-performance, both within jobs with low as well as high occupational physical demands.⁹ Mode of exercise training seems crucial for attaining positive effects in specific job categories and knowledge on muscular adaptations with workplace training is therefore essential for optimal training planning.

1.3. Aim of the paper

The aim of the present review is to present an overview of results from our workplace physical exercise training interventions regarding: (1) effects on lifestyle diseases (considered the “medicine” effect) and (2) effects beyond the health benefits (considered the “more than medicine” effect).

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