The 'Goldilocks Principle': designing physical activity at work to be 'just right' for promoting health

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Physical activity is generally accepted to promote good health. However, it is well documented that the wrong type of physical activity can be bad for health in both occupational and leisure contexts. For example, too much mechanical force can lead to musculoskeletal injury,[1] too frequent activity can lead to fatigue[2] and too prolonged standing can lead to varicose veins.[3] Similarly, too little force can lead to bone and muscle loss, too infrequent moderate/vigorous physical activity can lead to cardiorespiratory deconditioning and too little standing or walking can lead to impaired cardiometabolic health.[4]

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THE 'JUST RIGHT' PARADIGM, THE 'GOLDILOCKS PRINCIPLE'

Therefore, we argue that the benefits of physical activity, both at work and leisure, can only be seen when the various aspects of physical activity are 'just right.' When being 'just right,' activity promotes physical capacity and health, when being 'not right,' it impairs health. We coin this 'just right' paradigm, the 'Goldilocks Principle.' In the Goldilocks fairy tale, a child comes across a house in the woods belonging to a family of bears. She tried the porridge, chairs and beds; some were too hot/large/hard, some too cold/small/soft, but some were 'just right.' In exercise and sports, the Goldilocks Principle of 'just right' has been acknowledged for decades, while in occupational life, physical activity has been designed to 'not cause harm' instead of being 'just right.' We envision a large potential to maintain and promote health if physical activity at work could be designed according to the Goldilocks Principle.

The various dimensions of physical activity (eg, intensity, duration, frequency of different postures and movements) affect different body systems and function (eg, aerobic capacity, muscle strength, range of movement, balance, coordination). All

these aspects of physical activity at work are likely to be important to get 'just right' to have a health-promoting effect. While there is likely to be a range of 'just right' options, well-designed work should include tasks which stimulate a range of positive physiological responses, arranged sequentially to allow adequate variation and time for restoration so that these physiological responses will be triggered.

HOW MUCH IS JUST RIGHT?

Designing work that is physically health promoting is an issue for both blue and white-collar workers. Many workplaces have seen a development towards too much sitting. In response, many organisations now promote standing to reduce time in sitting. This is historically interesting as only a few decades ago, occupational interventions and policy were aimed at reducing and breaking up standing by introducing more sitting.[5] This example illustrates the need for a Goldilocks approach—designing work that has the 'just right' amount of different aspects of physical activity—for example, the right amount of sitting, standing and moving—arranged in a suitable time pattern.

Cleaners, in contrast, have long continuous periods of physical activity at low metabolic intensity, causing fatigue without promoting cardiorespiratory fitness. To have a health promotion effect, cleaning work could be designed to have higher intensity bursts separated by tasks offering recovery. Like planning an exercise programme for different athletes from different sports, so too designing health-promoting work should take account of individual worker capacities, work requirements and constraints, as well as non-work activities. Thus, work should be designed with consideration to workers' whole-of-life 24/7/52 physical activity.

Our reason for focusing on physical activity at work is that it has a huge reach and potential for good. One-third of workers report high physical activity at work.[6] However, these physically active workers have poorer health, not better health than workers without high physical activity at work. For example, male workers who often perform strenuous tasks have an 80% increased risk of ischaemic heart disease mortality compared with workers who seldom/never perform strenuous work tasks (even after adjusting for a range of potential confounders).[7] Likewise, a high occupational physical workload is related to an increased risk of back pain.[8] The physical activity in their work is not 'just right' and this exacerbates the socioeconomic health gap. Designing work to be physically beneficial could reach all workers—including the lower socioeconomic group (with its attendant multiple health risks and its traditional lack of response to public health leisure activity campaigns).

DESIGNING WORK TO BE 'JUST RIGHT' AND HEALTHY!

Designing work which appropriately stresses workers physically will help maintain their capacity. With many societies facing an ageing population, maintaining physical capacity as the workforce ages is critical to sustained productivity and standards of living. Having 'just right' physical demands at work may improve productivity, enable people to maintain employment, continue paying taxes, prevent some chronic disease and reduce treatment costs for chronic disease. It is likely that the Goldilocks Principle could also be applied to mental demands and social conditions at work and thus have a positive impact on mental, as well as physical, health.

Traditionally physical activity at work has been designed with the goal of being productive, but not kill or harm the worker.

> We argue that work should aim to do more than just have no negative health impact; it should aim for a positive health impact.

It is clear that physical activity—or inactivity—at work that is not 'just right' can be bad for the health of workers. The Goldilocks Principle offers a new paradigm for work design which can help address some of the major issues facing workplaces and societies now: socioeconomic health inequities, ageing population and increasingly sedentary population.

Correction notice This paper has been amended since it was published Online First. The third author's surname was incorrect and this has now been updated.

Contributors LS, SEM and AH conceived and wrote the paper.

Competing interests None declared.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No data involved.

To cite Straker L, Mathiassen SE, Holtermann A. *Br J Sports Med* 2018;**52**:818–819.

Received 9 March 2017
Revised 10 April 2017
Accepted 7 June 2017
Published Online First 29 June 2017

Br J Sports Med 2018;**52**:818–819.
doi:10.1136/bjsports-2017-097765

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