Differences in the accuracy of self-reported task durations between workers with and without acute non-specific low-back pain

Jean Alexander Pulido; Lope Hugo Barrero; Svend Erik Mathiassen; Jack Dennerlein; Paola Torres; Luis Gabriel Bernal

a Centro de Estudios de Ergonomía, Department of Industrial Engineering, School of Engineering, Pontificia Universidad Javeriana, Bogotá, COLOMBIA; b Centre for Musculoskeletal Research, Department of Occupational and Public Health Sciences, University of Gävle, SWEDEN; c Department of Physical Therapy, Movement, and Rehabilitation Sciences, Bouvé College of Health Sciences, Northeastern University, Boston, MA, USA; d Academic Research, Sede Santa Bárbara, Javesalud-IPS, Bogotá, COLOMBIA

1. Introduction

Self-reported task durations are widely used as measures of occupational exposure in their own right, or as inputs when estimating job exposures assumed to be related to musculoskeletal disorders (MSD) using time-weighted averages of the exposures of tasks in the job [1-3]. Bias in these self-reports can introduce serious errors in estimates of job exposures [4], and greatly affect associations between exposures and MSD in epidemiologic research [5], especially if the bias is differential, i.e. related to the individuals’ health. Differences in perceived task durations between individuals with and without MSD are likely, considering that they perceive exposures differently [6], but such differential bias has been documented mainly in observational field studies, which leaves room for alternative explanations of the difference other than the presence of MSD [7]. Therefore, research that explicitly controls extrinsic environmental factors can help uncover whether disorders modify the ability to correctly report task durations.

1.1 Aim

To estimate the extent to which the ability to correctly report task durations differs between individuals with and without acute non-specific low-back pain.

2. Methods

This laboratory study is part of a comprehensive effort to identify sources of bias in self-reported task durations and provide statistical models that can calibrate workers’ self-reports if they are not correct. Five workers with acute non-specific low-back pain and five control workers without non-specific low-back pain were recruited (21 to 54 years old, 60% women), as diagnosed by a medical examination at our partner health center. Workers were matched by gender, age group and job type (blue collar vs white collar). All workers performed three different tasks, i.e. shelving boxes, filing documents and typing articles, for three hours in a discontinuous work pattern (60 min in total of each task, divided into three periods of 20 min) in the laboratory at fixed work pace. Workers were informed that the total amount of work was three hours but were not allowed to carry any time device, such as watches, and were not informed in advance that they were going to estimate
individual task durations. At the end of the work period, workers were asked to report task durations in hours and minutes and rate other aspects of the executed work. T-tests were performed to compare estimates of durations between the two groups.

3. Results

On average, workers with low-back pain overestimated the duration of shelving boxes by 41.7%; but underestimated the duration of filing documents and typing articles by 20% and 21.7%, respectively (figure 1). In contrast, workers without low-back pain overestimated the duration of filing documents by 10%, underestimated the duration of typing articles by 10%, but showed, on average, no bias in the estimation of duration of shelving boxes (Figure 1). Differences in average perceived durations between the two groups were statistically significant only for shelving boxes. Also, subjects in the non-pain group appear to be much more diverse in their ability to estimate task durations than the subjects with pain (figure 1); but this result needs to be confirmed with the full sample.

<table>
<thead>
<tr>
<th></th>
<th>Pain Presence - Mean</th>
<th>Pain Absence - Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shelving</td>
<td>41.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Filing</td>
<td>-20.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>Typing</td>
<td>-21.7%</td>
<td>-10.0%</td>
</tr>
</tbody>
</table>

Figure 1. Bias by type of task, calculated as Bias = (Estimated Time – True Time) / True Time (Group Mean and Standard Deviation between subjects)

4. Discussion

We observed a differential bias in self-reported task durations by low-back pain status. This differential bias is unlikely to be explained by extrinsic factors like work pattern or real task duration considering the controlled duration and load of the executed tasks and the careful selection of cases and controls. The fact that subjects with low-back pain overestimated the most physically
demanding task agrees with previous studies, and may be explained by an elevated perceived effort caused by a compromised capacity to do work, or by this particular task provoking an experience of pain. If confirmed by further data collections, group-specific efforts to correct such bias should be developed in the context of epidemiological research of occupational musculoskeletal disorders.

Acknowledgements

The authors wish to thank the Colombian Agency for the Development of Science and Technology COLCIENCIAS, and PONTIFICIA UNIVERSIDAD JAVERIANA, for their financial and academic support to this research project.

Keywords: MSD; Self-Reports; Tasks’ Duration; Assessment.

References: