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Is whole day measurement of arm elevation with accelerometers an option when performing risk assessments at work?



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Work with elevated arms is a risk factor for Neck/ shoulder pain



van Rijn RM, Huisstede BM, Koes BW, Burdorf A. Associations between work-related factors and specific disorders of the shoulder – a systematic review of the literature. *Scand J Work Environ Health*. maj 2010;36(3):189–201

Mayer J, Kraus T, Ochsmann E. Longitudinal evidence for the association between work-related physical exposures and neck and/or shoulder complaints: a systematic review. *Int Arch Occup Environ Health*. augusti 2012;85(6):587–603



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Risk assessment

Visual observation

Subjective method

Reliability issues



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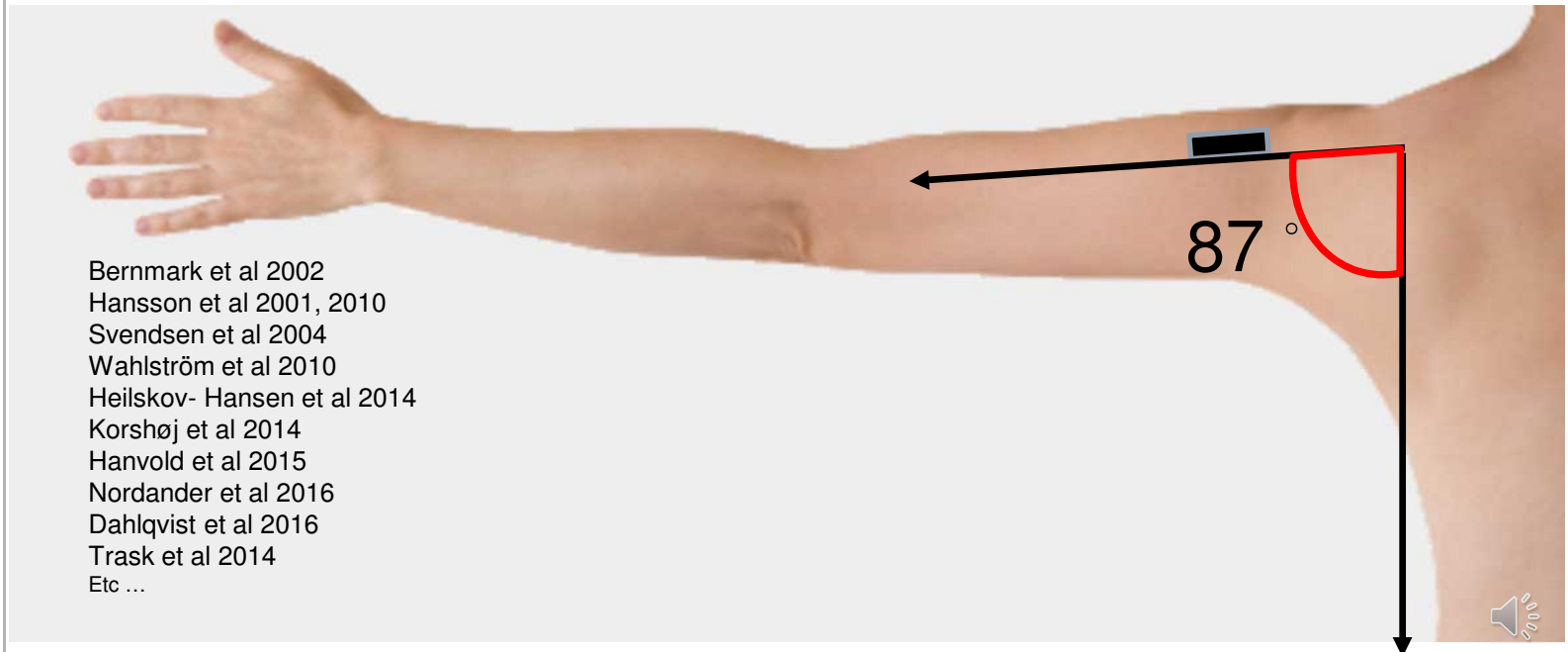


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Bernmark et al 2002
Hansson et al 2001, 2010
Svendsen et al 2004
Wahlström et al 2010
Heilskov- Hansen et al 2014
Korshøj et al 2014
Hanvold et al 2015
Nordander et al 2016
Dahlqvist et al 2016
Trask et al 2014
Etc ...





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Suggested action limits

Arm elevation above 60°
more than 10% of the workday

Applies if the arms are not supported
(e.g. at a table surface)



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Study 1

Aim

1) Explore how arm elevation differs between different occupations and between work and **leisure**





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NOMAD

N= 197

13 different occupations

Accelerometer measurements 2-4 days

Work and Leisure



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Forskningscenter for Arbejdsmiljø



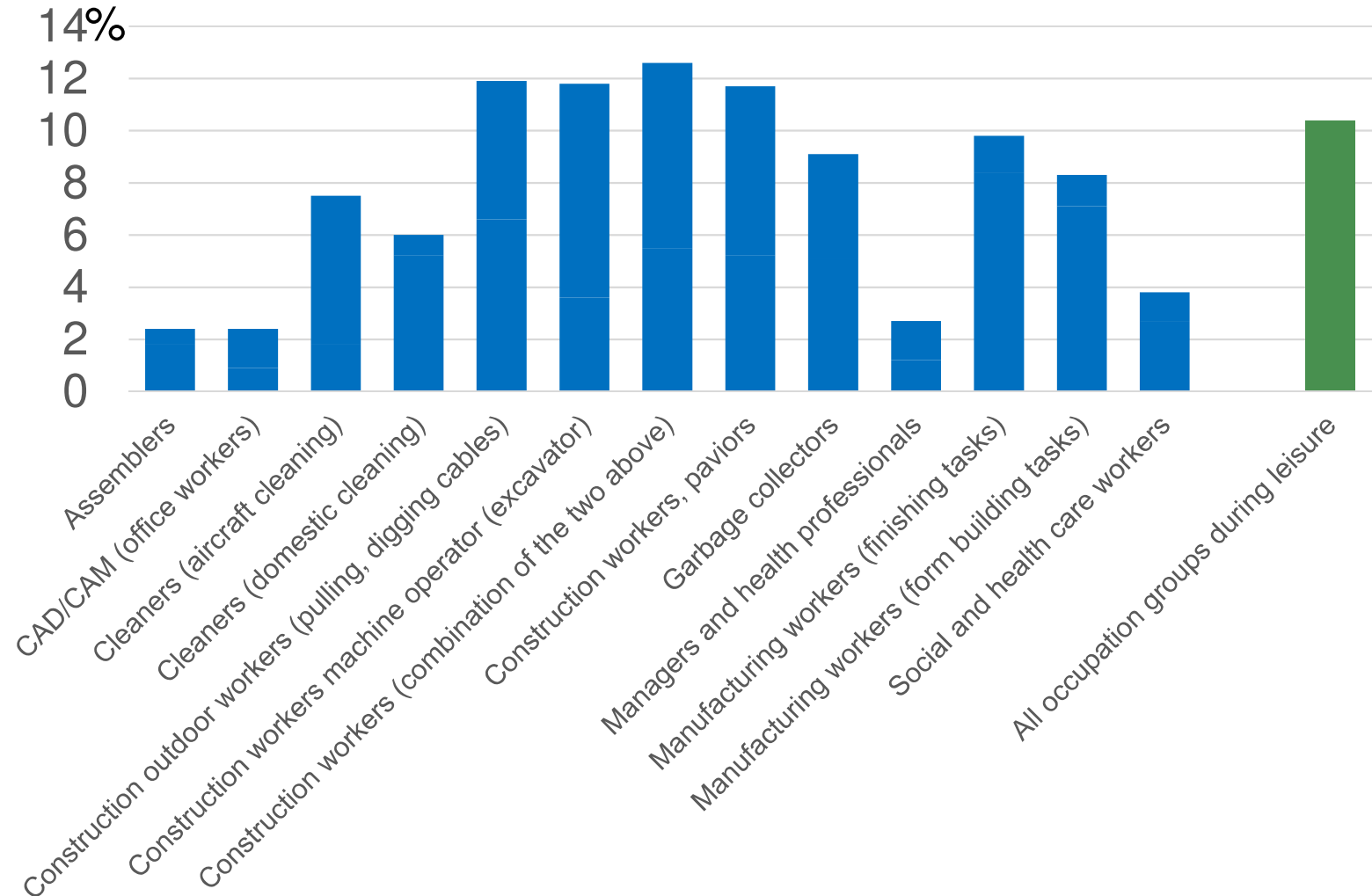


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% of time with arm elevated >60°



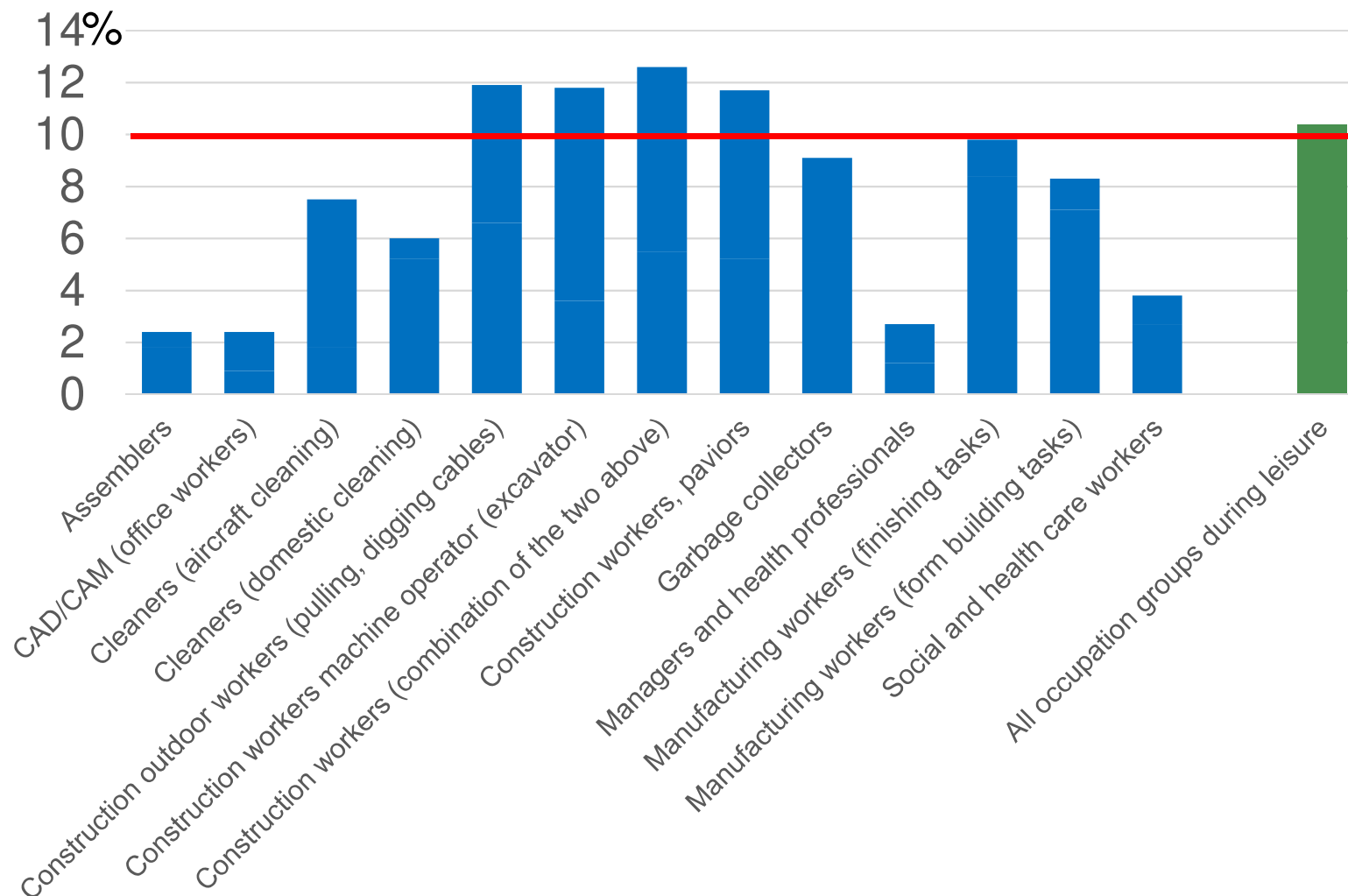


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% of time with arm elevated >60°





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Riskful armposition?



Trask et al. *BMC Medical Research Methodology* 2013, **13**:124
<http://www.biomedcentral.com/1471-2288/13/124>

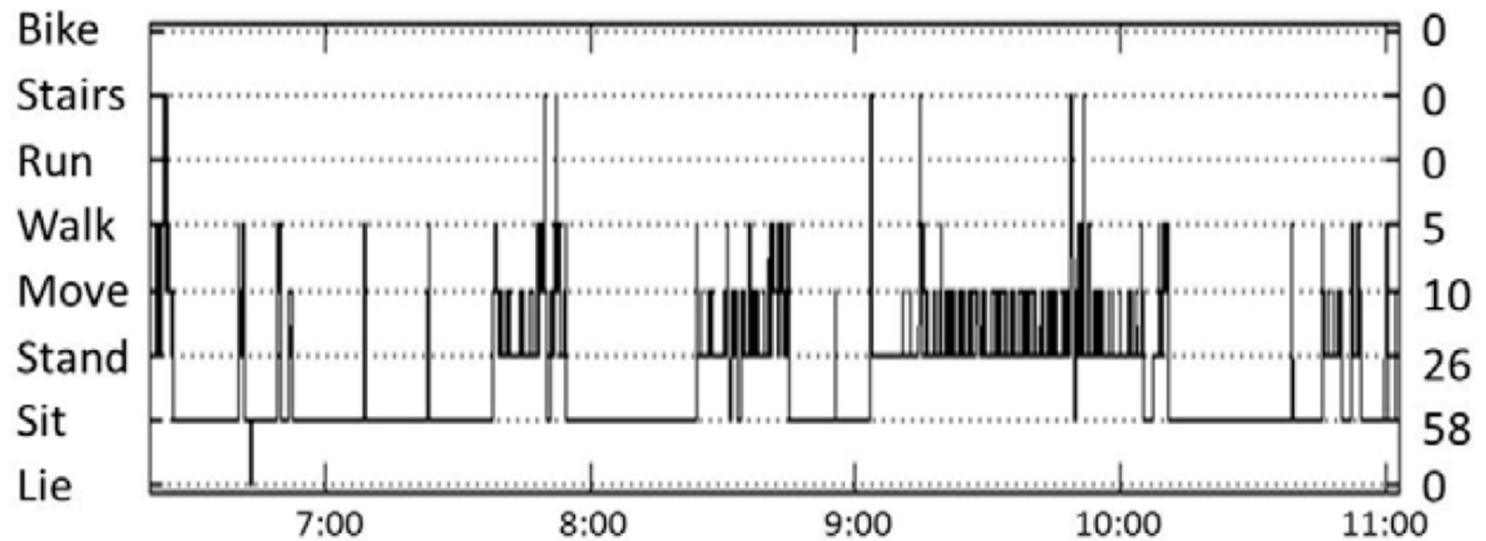




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Acti4 Algorithm

Thigh accelerometer



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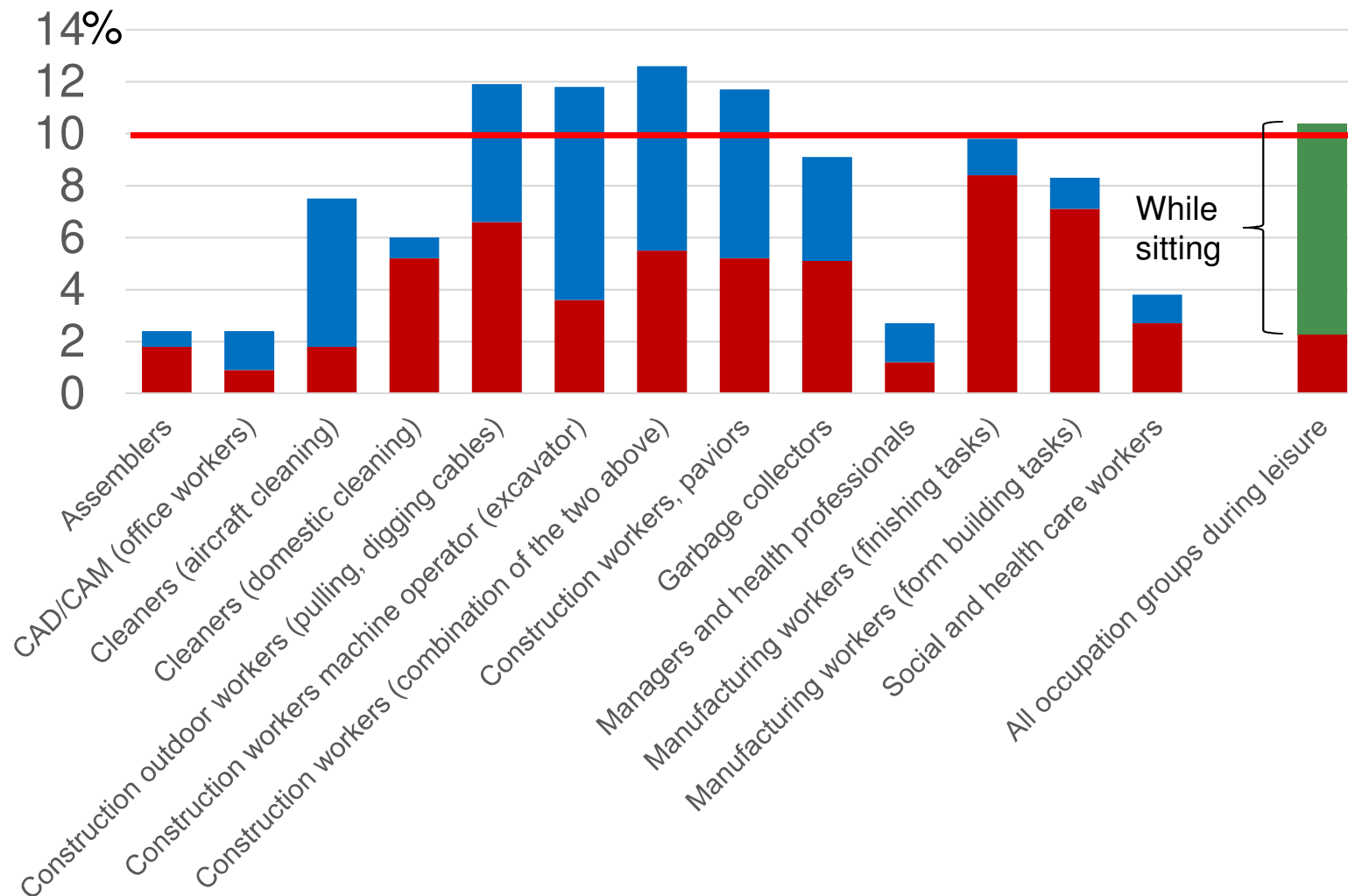
National Research Centre
for the Working Environment





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% of time with arm elevated >60°



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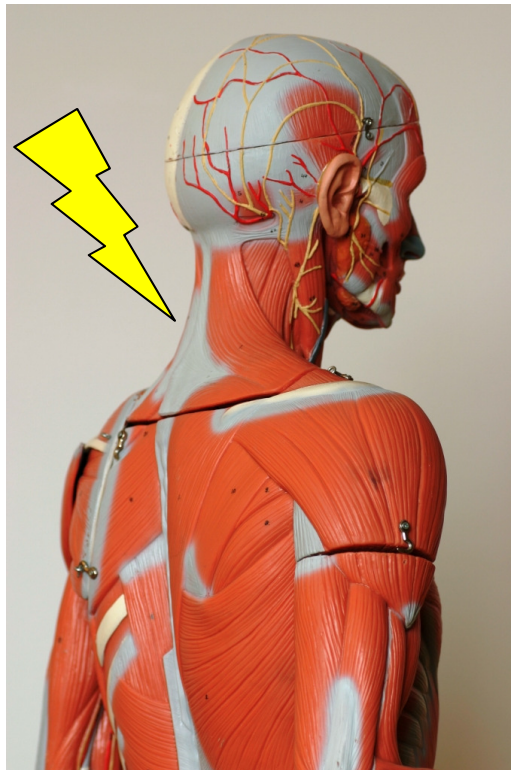


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Study 2

Aim

2) Assess if there is an association between proportion of time with arm above 60° at work and neck/shoulder pain



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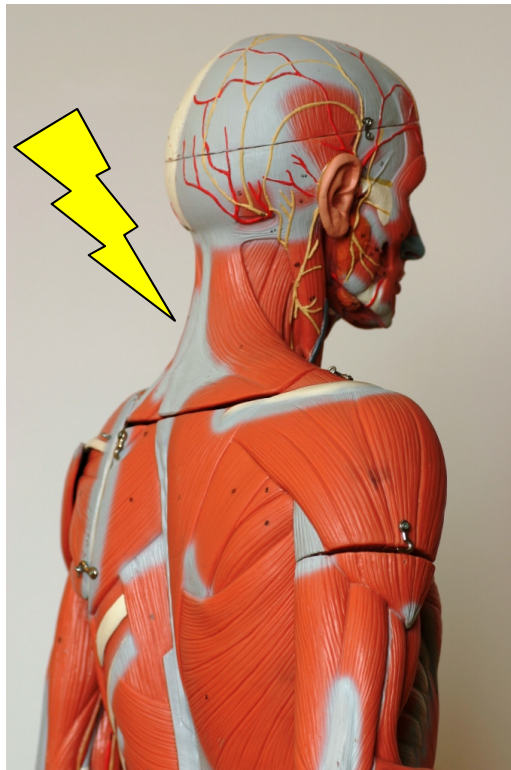
Association with pain? DPHACTO

N= 654

Transport workers

Cleaners

Manufacturing workers



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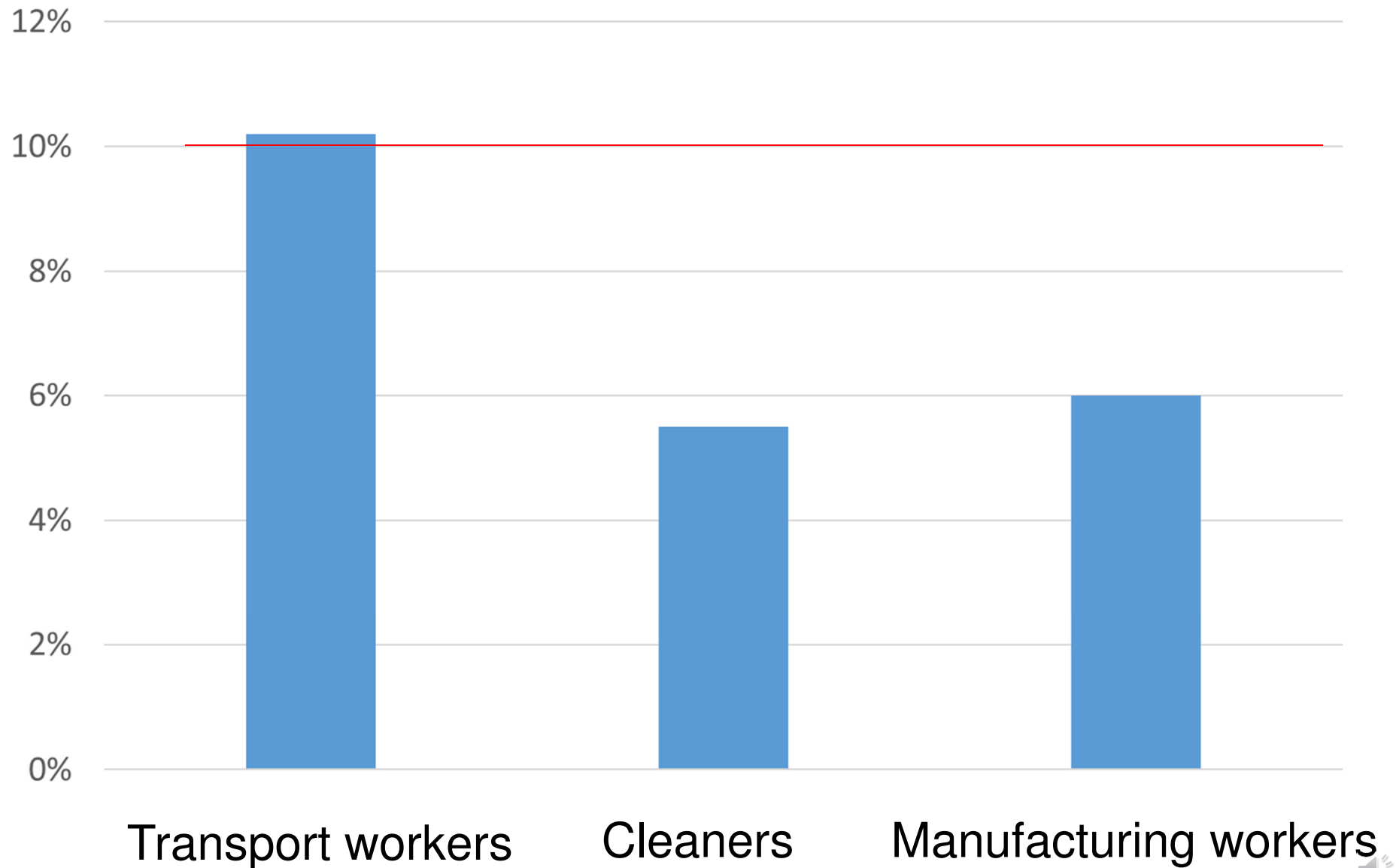


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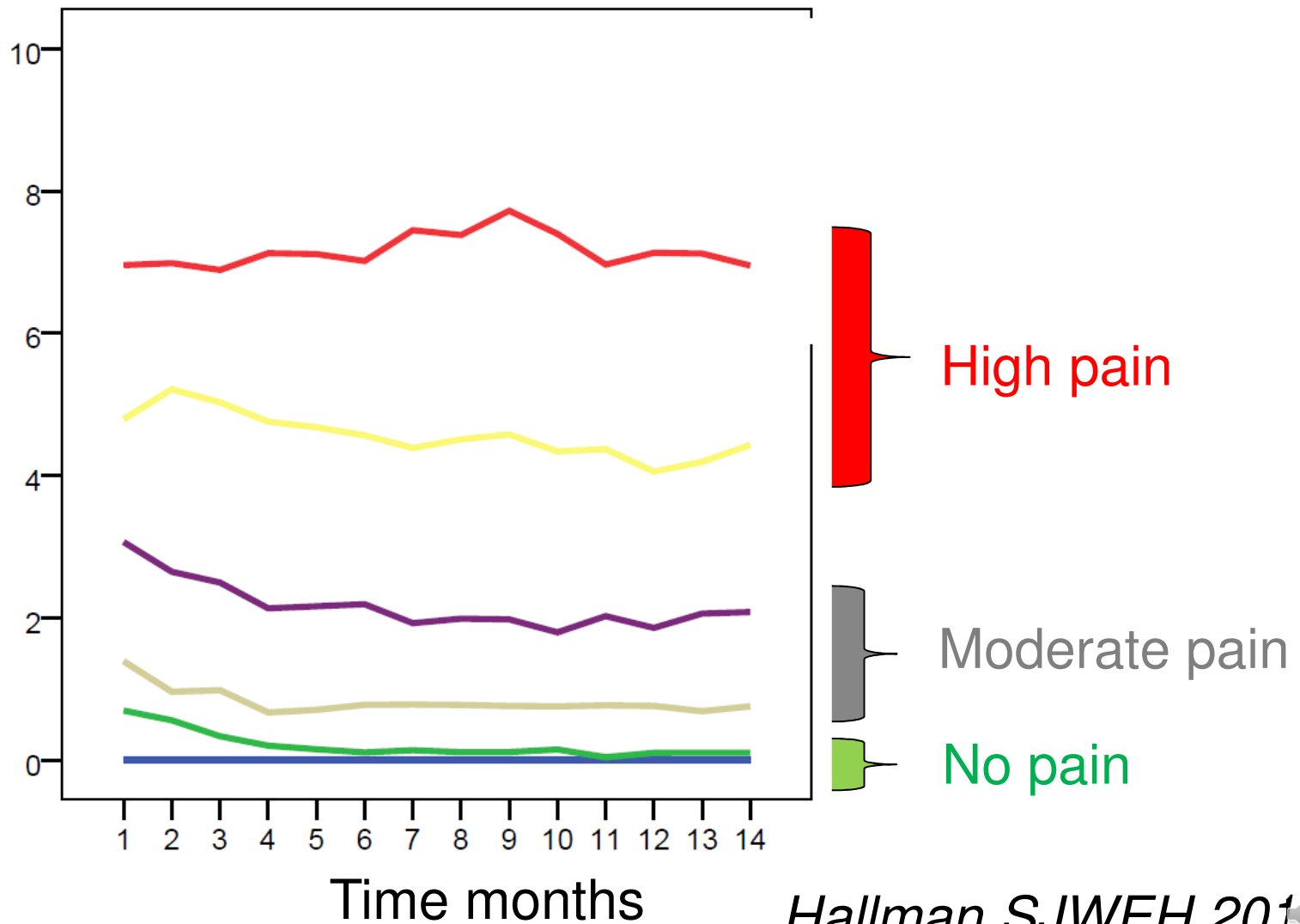
% of time with arm elevated $>60^\circ$





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Pain in neck shoulder (mean)
NRS



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Hallman SJWEH 2018



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Odds ratios (95% CI)

Not adjusted 0,93 (0,88- 0,98)

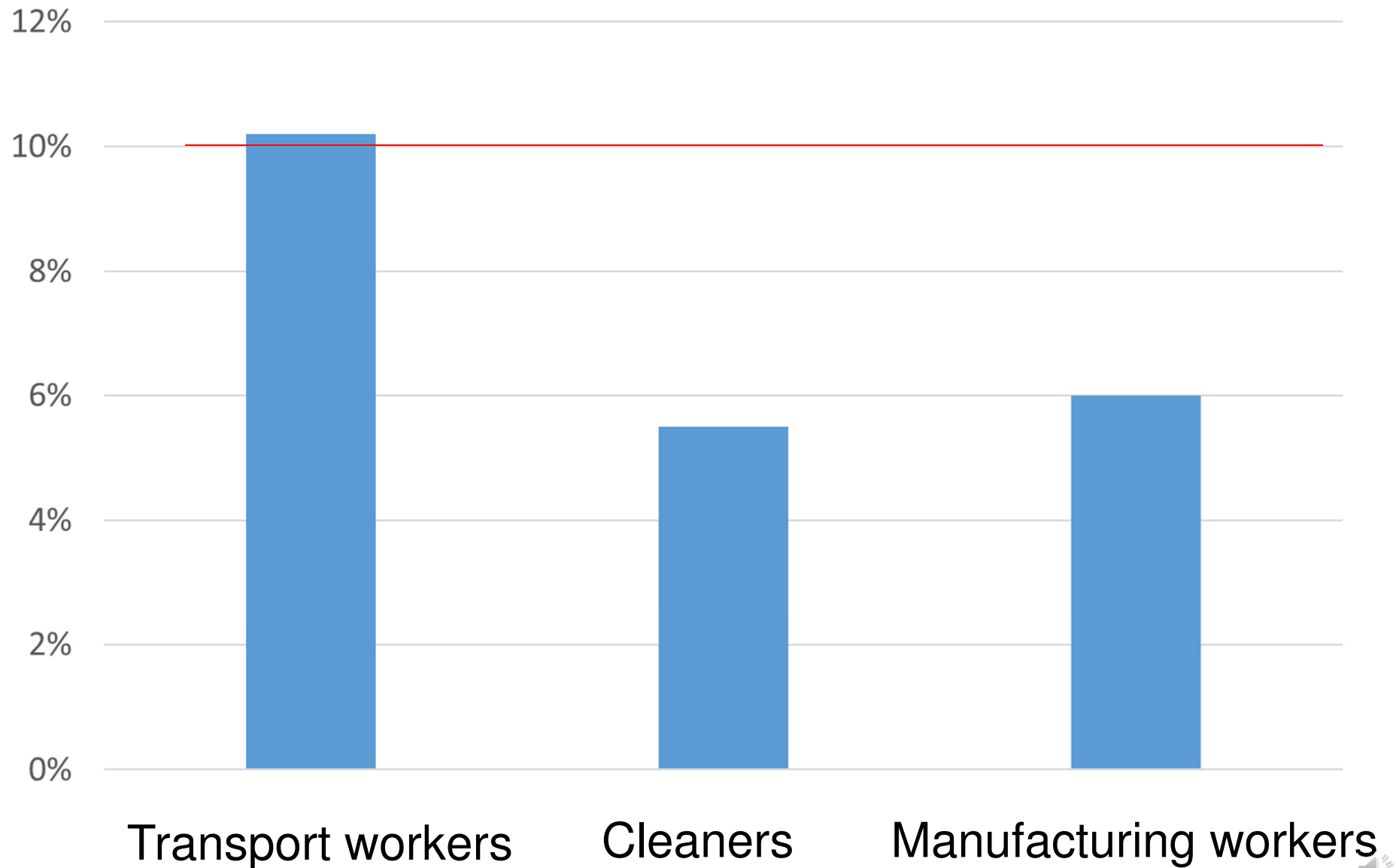
Adjusted* 0,96 (0,90- 1.03)

*Age, Gender, Influence and support at work, heavy lifts at work



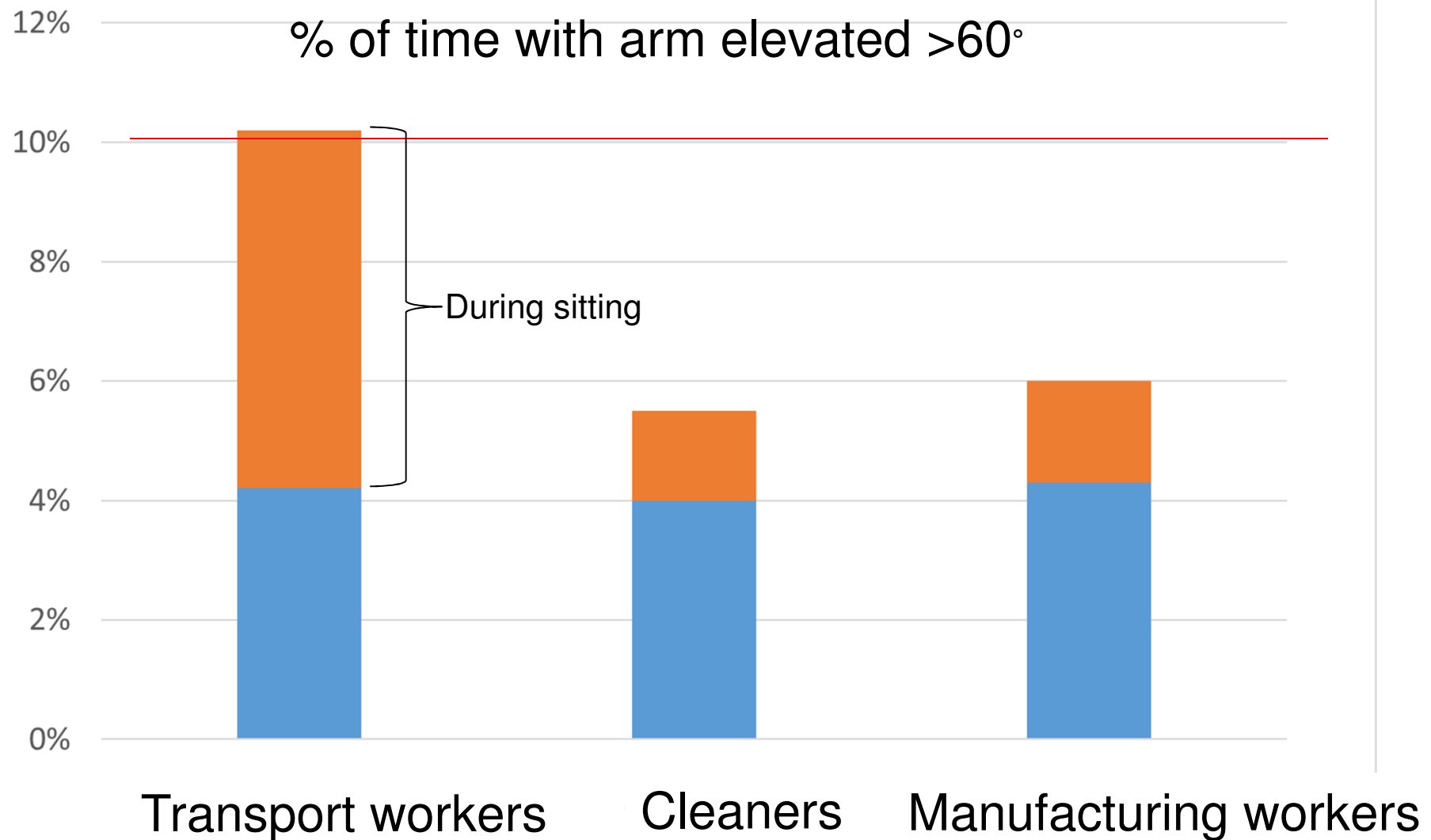


% of time with arm elevated $>60^\circ$



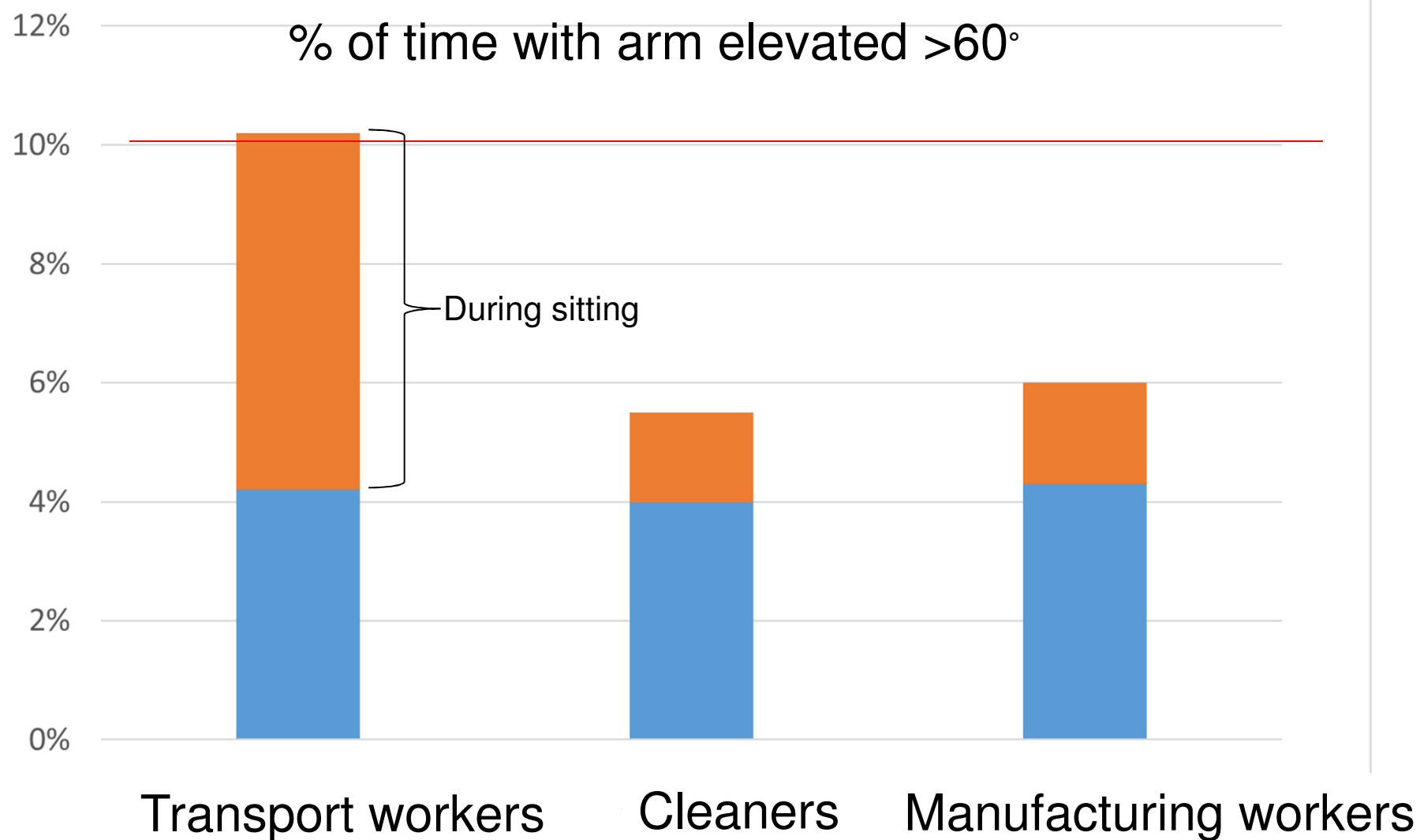


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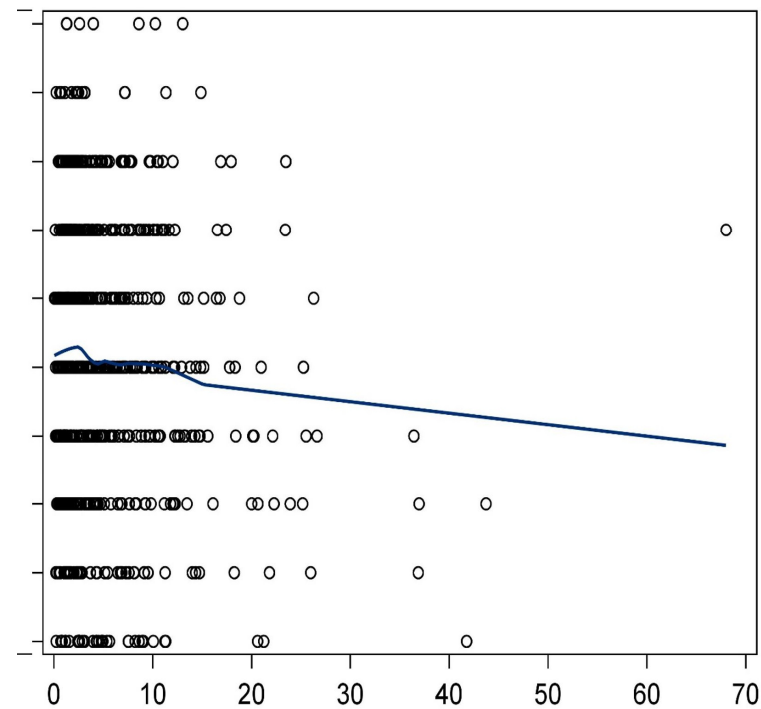
Self rated physical demands



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Self rated physical demands

During sitting



Proportion of time with
elevated arms > 60°



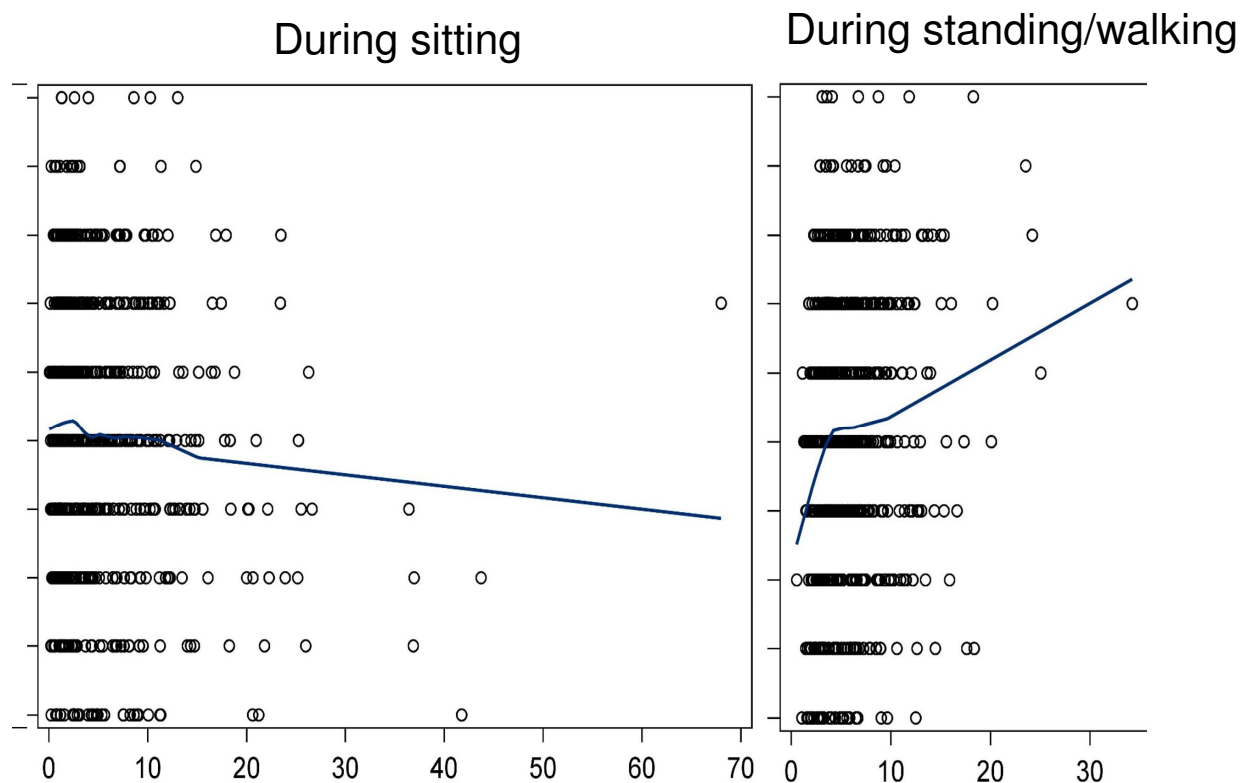
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Self rated physical demands



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Self rated physical demands



Proportion of time with
elevated arms > 60°



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It depends





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Accelerometers is not an option to substitute observations



Accelerometers may be used in situations where you know that arm elevation correspond to shoulder load and when you want to quantify this exposure.



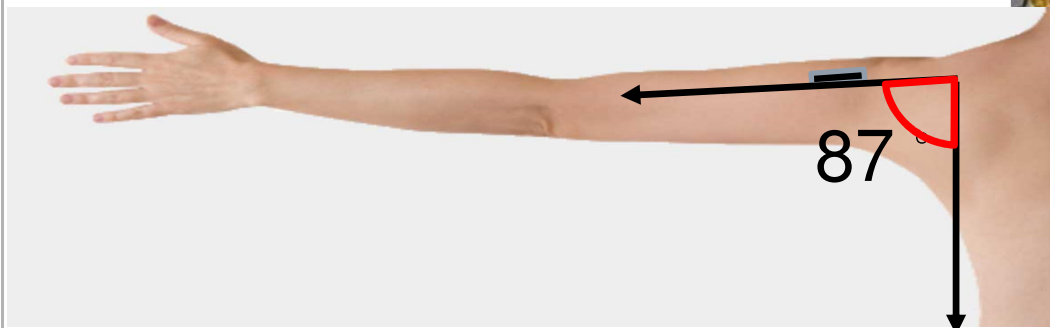
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The way forward towards **the** method?

Workers perceptions,
visual observations and
Technical measurements
together in concert!



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Thank you!



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I will also acknowledge Pascal Madeleine and Tobias Nordqvist