

Let's make physically demanding jobs sustainable

INSIGHTS INTO THE PHYSICAL ACTIVITY HEALTH PARADOX

Margo Ketels

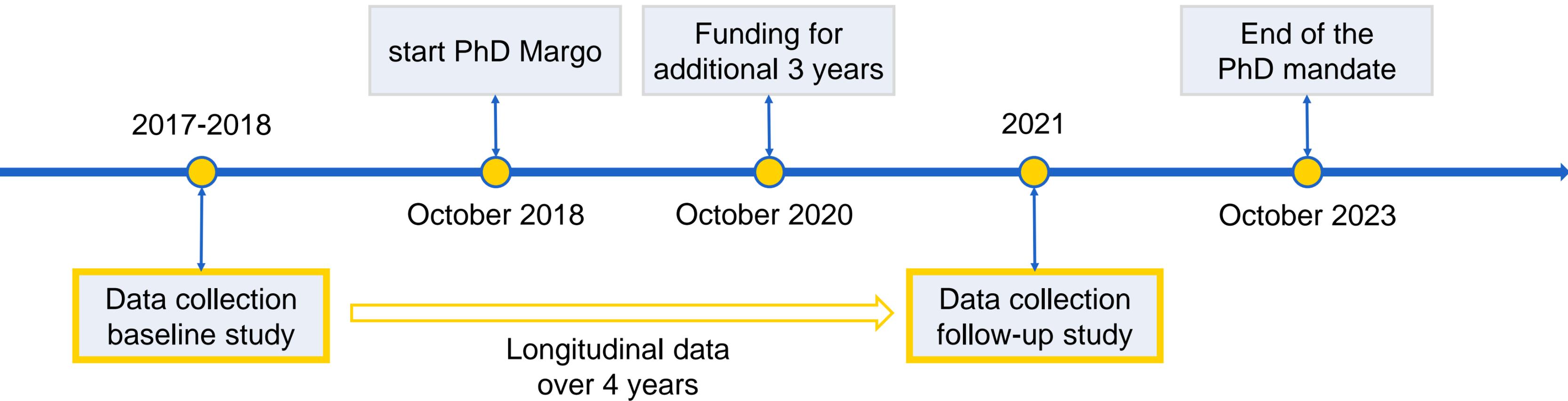
PhD student

Presentation Ugent@Work

18-03-2021

- PhD student since October 2018
 - Master in **Physical Education and Movement sciences**
 - Department of **Public Health and Primary Care**
 - Unit of prevention and epidemiology
 - Under the supervision of **Prof. dr. Els Clays**





BASELINE DATA

- **Flemish Employees' Physical Activity (FEPA) study**
- **Cross-sectional field study:**
 - Convenience sampling
 - 7 companies (service, production sector, food industry, and nurses)
 - Mainly workers with physically demanding jobs (84%)
 - 16% administrative workers
 - Inclusion criteria:
 - Non-pregnant, Dutch speaking, employed > 50% and no exclusive night shift
 - 401 participants
 - 167 men and 234 women
 - Aged between 20 and 65 years (39 ± 11)

PROTOCOL

Questionnaire

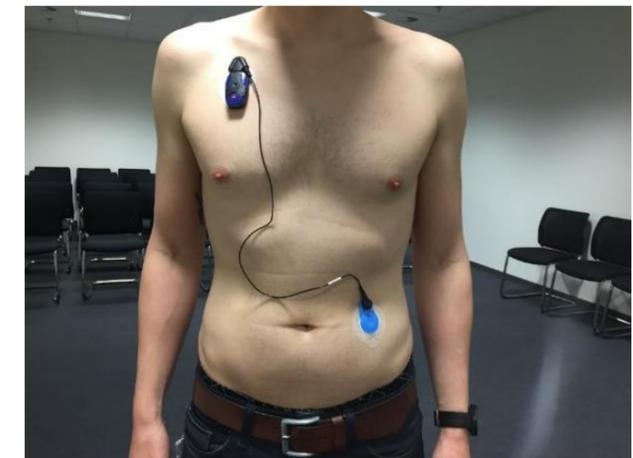
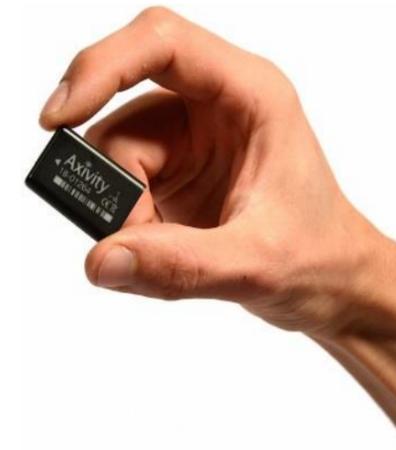
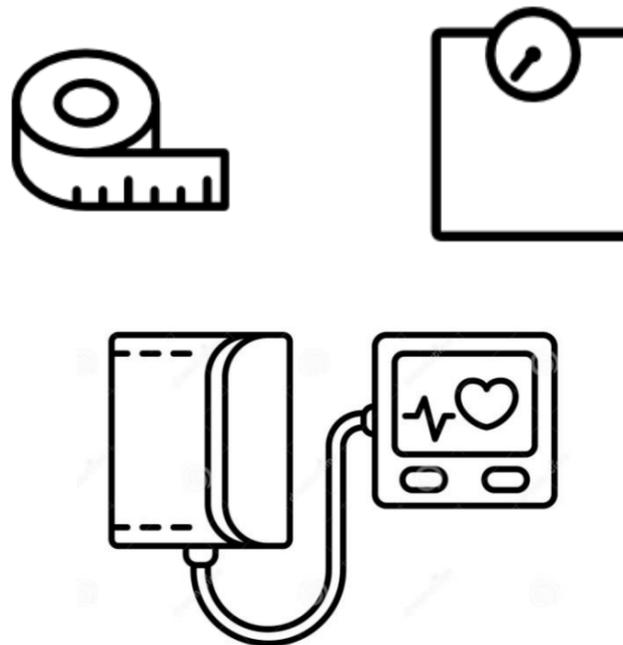
- Socio-demographic
- Work-related
- Lifestyle and health

Baseline screening

- Resting blood pressure and HR
- Anthropometrics
- Harvard step test
(estimating cardiorespiratory fitness)

Objective measurements

- Physical activity: accelerometers
- Heart rate & HRV: Faros eMotion 90°



2017-2020

start PhD Merge

Funding for

End PhD

2023

What are we investigating?

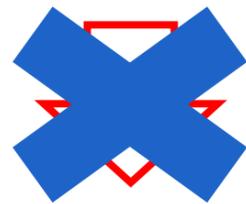
Data collection baseline study

Data collection follow-up study

The diagram features a horizontal timeline arrow pointing right. A central rounded rectangle with a blue border contains the text 'What are we investigating?'. Above the timeline, three light blue boxes are labeled 'start PhD Merge', 'Funding for', and 'End PhD'. Below the timeline, two light blue boxes are labeled 'Data collection baseline study' and 'Data collection follow-up study'. A vertical double-headed arrow connects the 'Data collection baseline study' box to a grey dot on the timeline at the '2017-2020' mark. The year '2023' is marked further along the timeline.

PHYSICAL ACTIVITY HEALTH PARADOX

Occupational physical activity
(OPA)

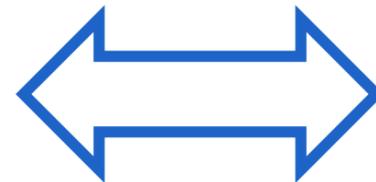


Negative health effects

Leisure time physical activity
(LTPA)



Beneficial health effects





Article

The Relation between Domain-Specific Physical Behaviour and Cardiorespiratory Fitness: A Cross-Sectional Compositional Data Analysis on the Physical Activity Health Paradox Using Accelerometer-Assessed Data

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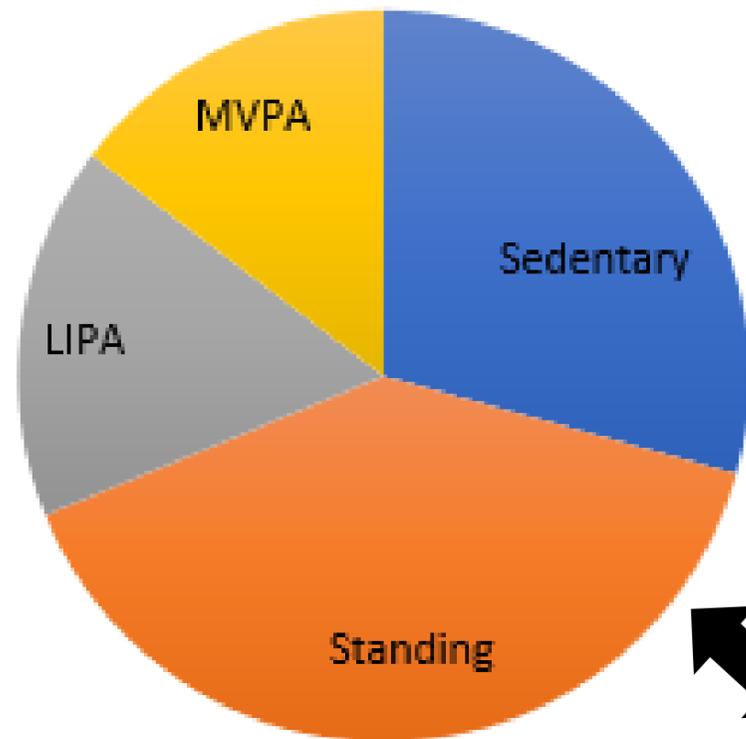
Received: 30 September 2020; Accepted: 26 October 2020; Published: 29 October 2020



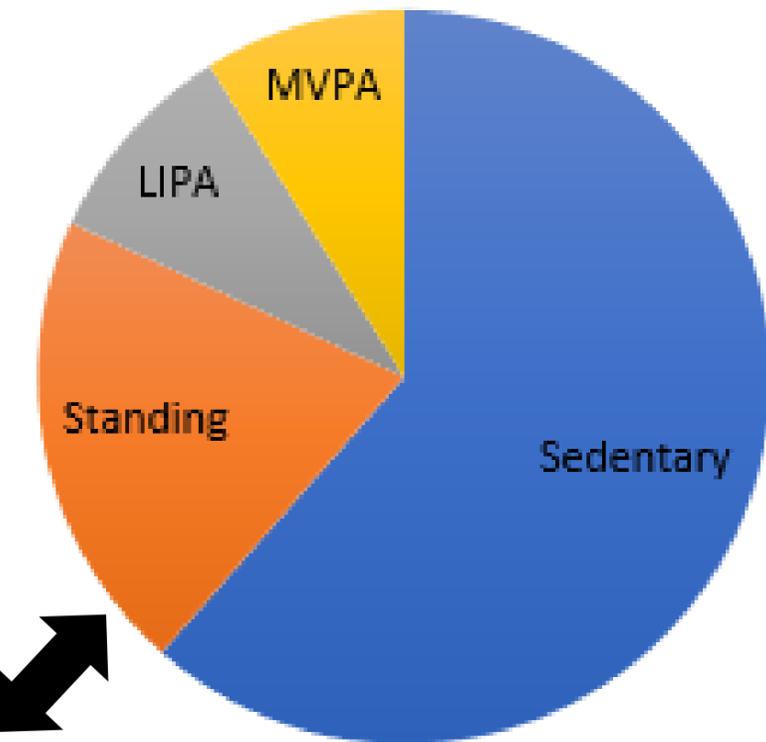
check for
updates

RESEARCH AIM

Work



Leisure time



Outcome:
Cardiorespiratory fitness

- **Sedentary behaviour:** sitting + lying
- **Standing**
- **LIPA:** slow walking + moving
- **MVPA:** fast walking + running + walking on stairs

MEASUREMENTS

Total of 309 workers, including only workers with physically demanding jobs.

Questionnaire	Baseline screening	Objective measurements
<ul style="list-style-type: none"> Confounding variables 	<ul style="list-style-type: none"> Anthropometrics Harvard step test (estimating cardiorespiratory fitness) 	<ul style="list-style-type: none"> Physical activity: accelerometers (sitting, standing, LPA, MVPA)

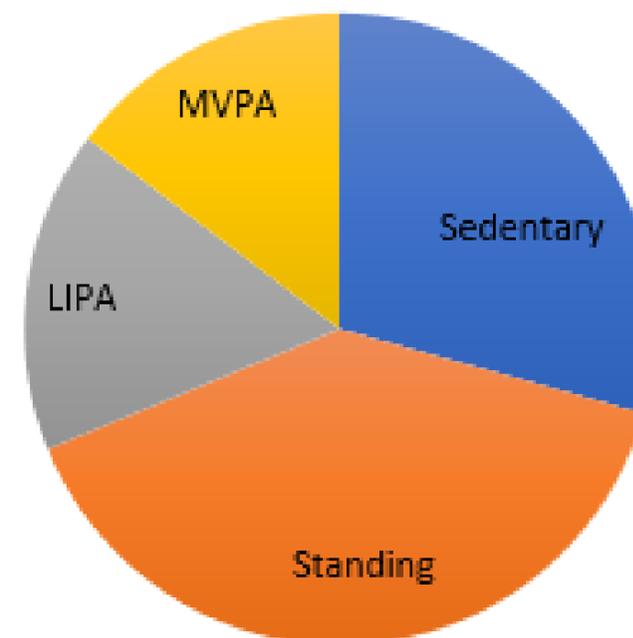


STATISTICAL ANALYSES

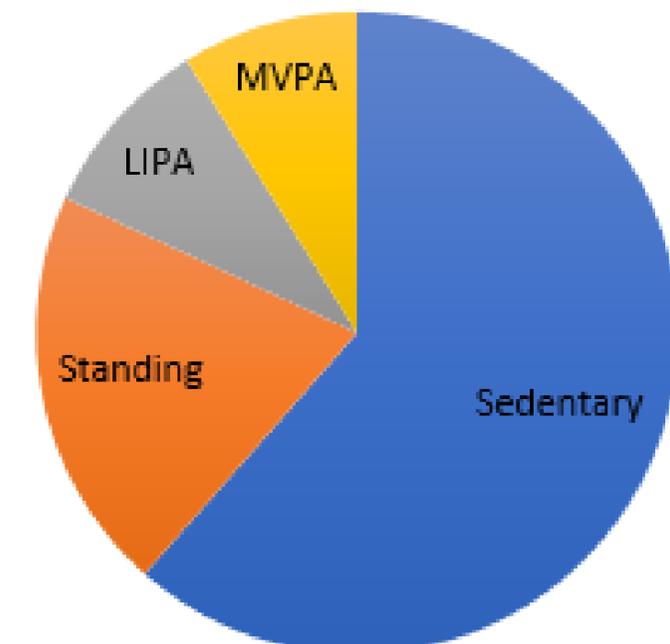
Compositional Data Analysis (CoDA) approach

- **Exposure:** 2 times, for work and leisure time, 4-part composition consisting of...
- **Outcome:** cardiorespiratory fitness
- **Multiple linear regression analysis**
 - Adjusted for possible confounding variables

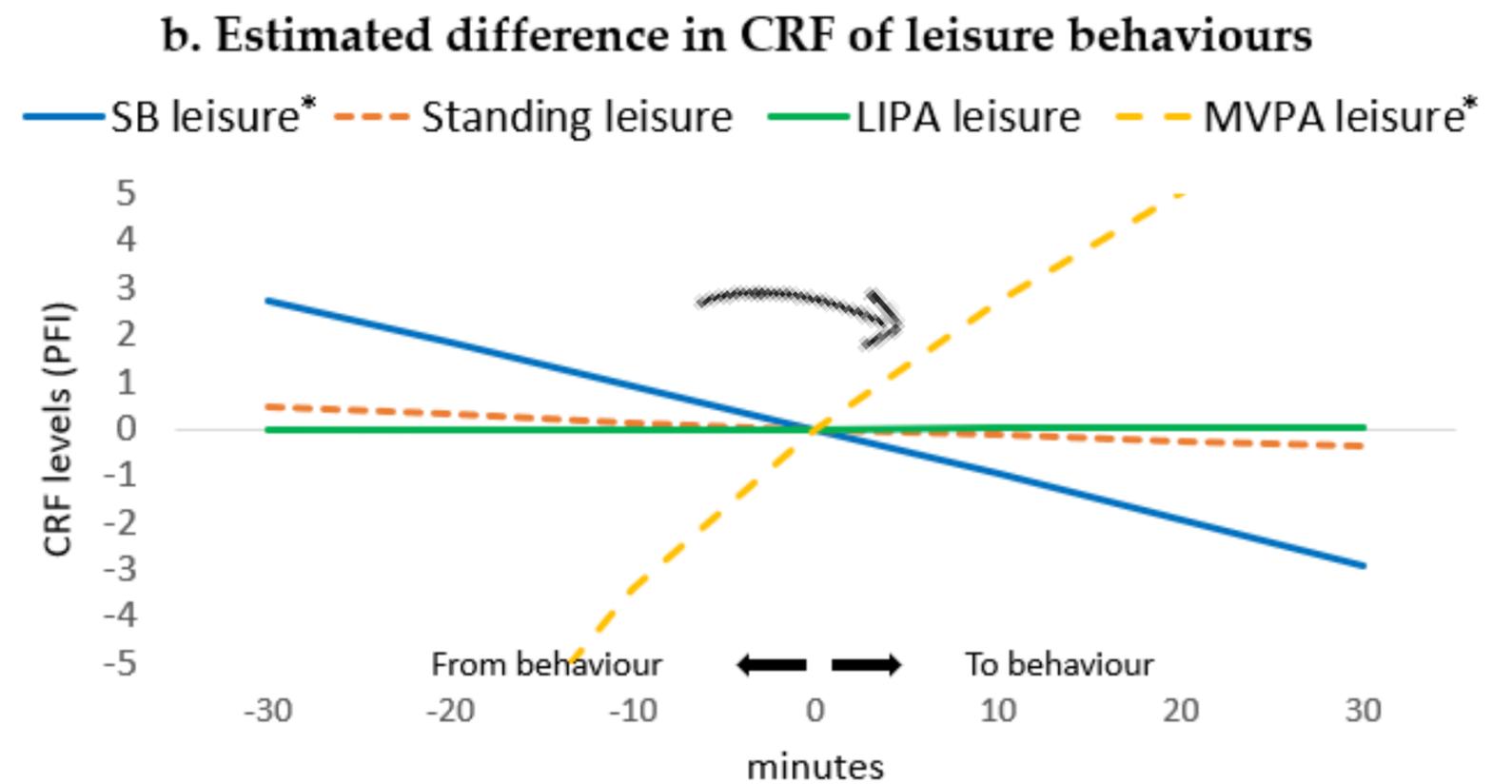
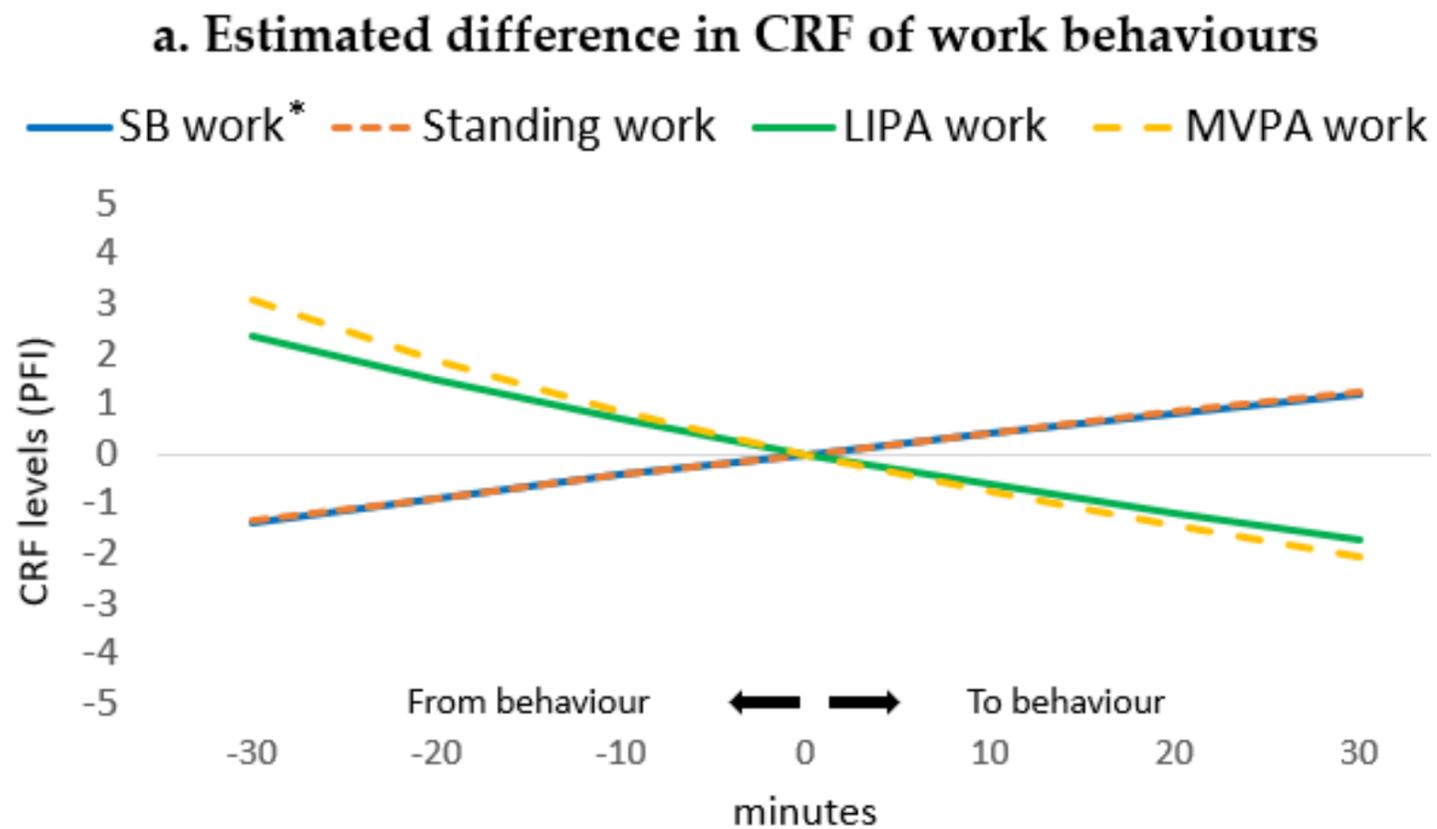
Work



Leisure time

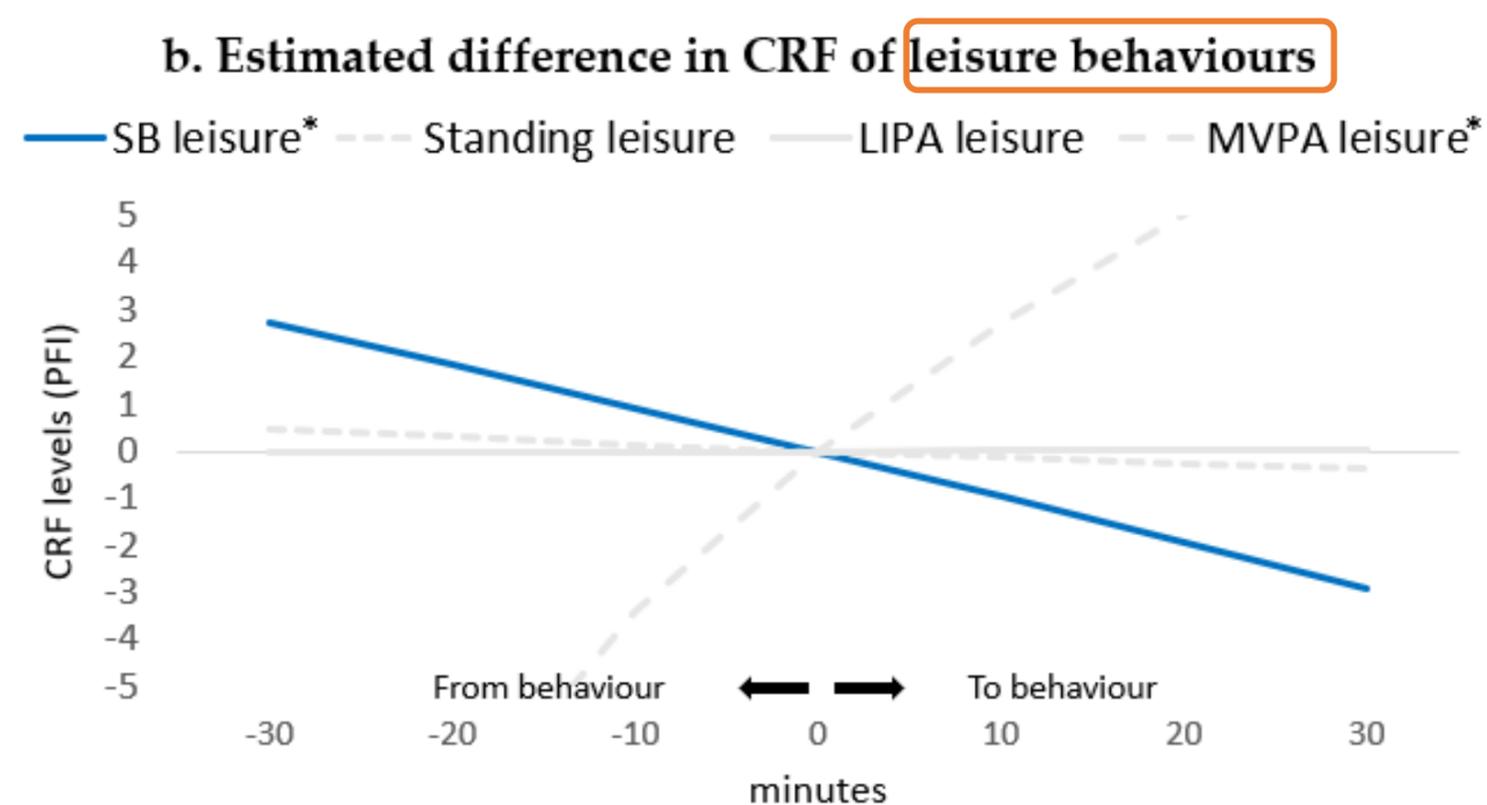
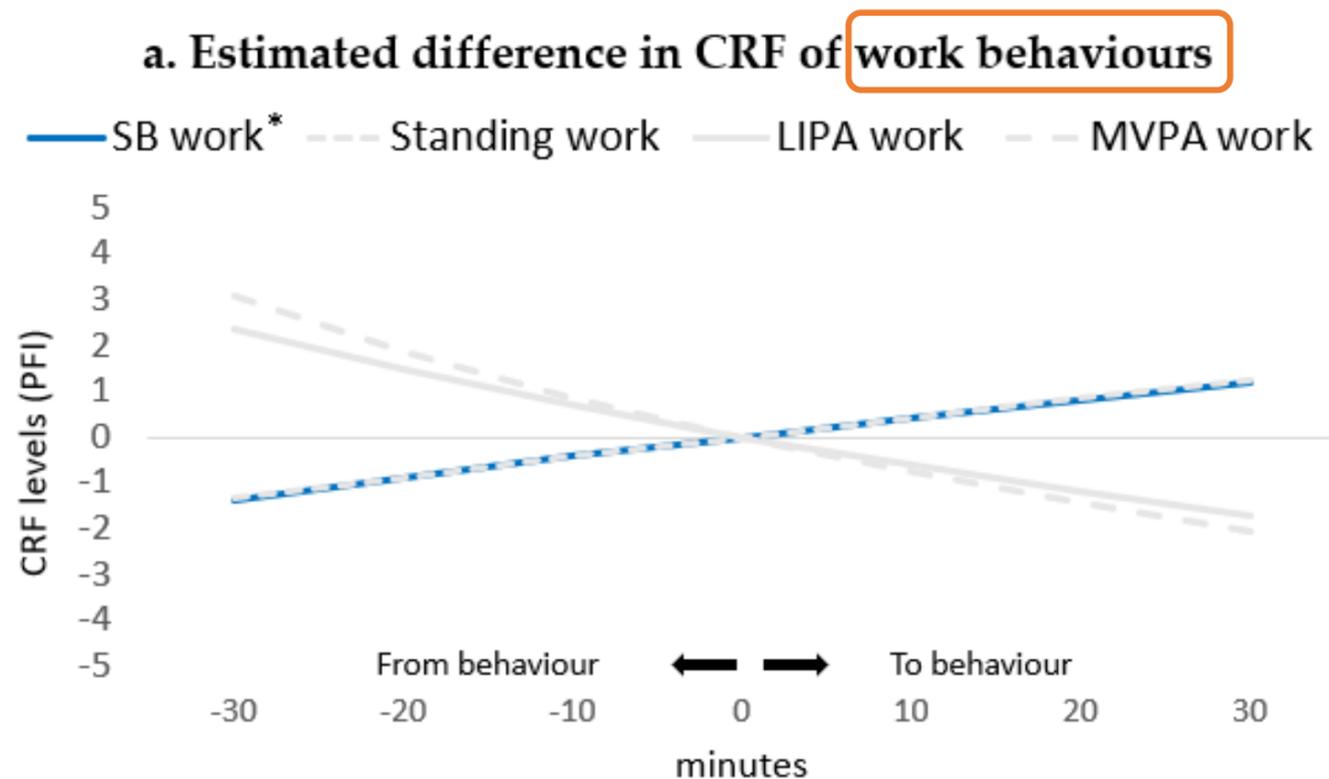


RESULTS



*Reallocating 10 minutes of all the other leisure time behaviour to MVPA was associated with higher CRF levels by 2.73.
Reallocating 10 minutes from MVPA equally to other leisure time behaviour was associated with lower CRF levels by 3.41.*

RESULTS: SEDENTARY BEHAVIOUR



CRF levels



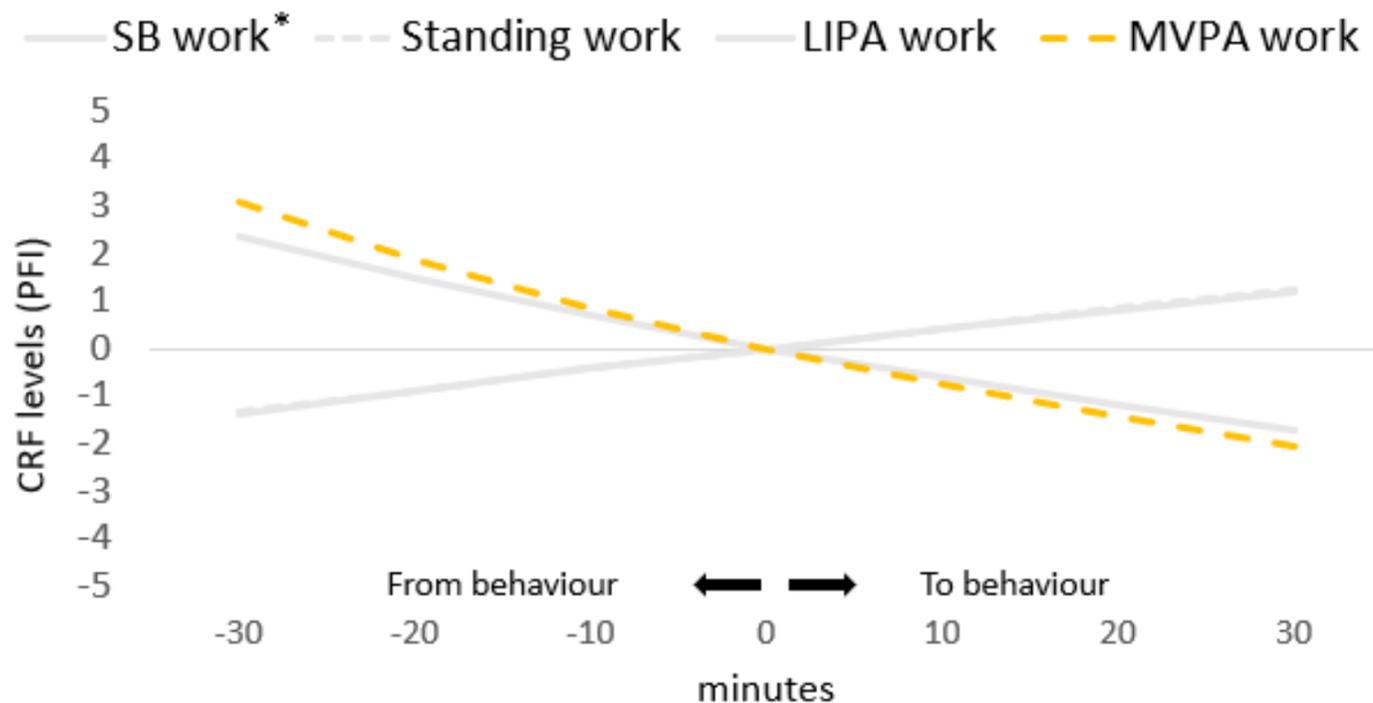
Sedentary behaviour



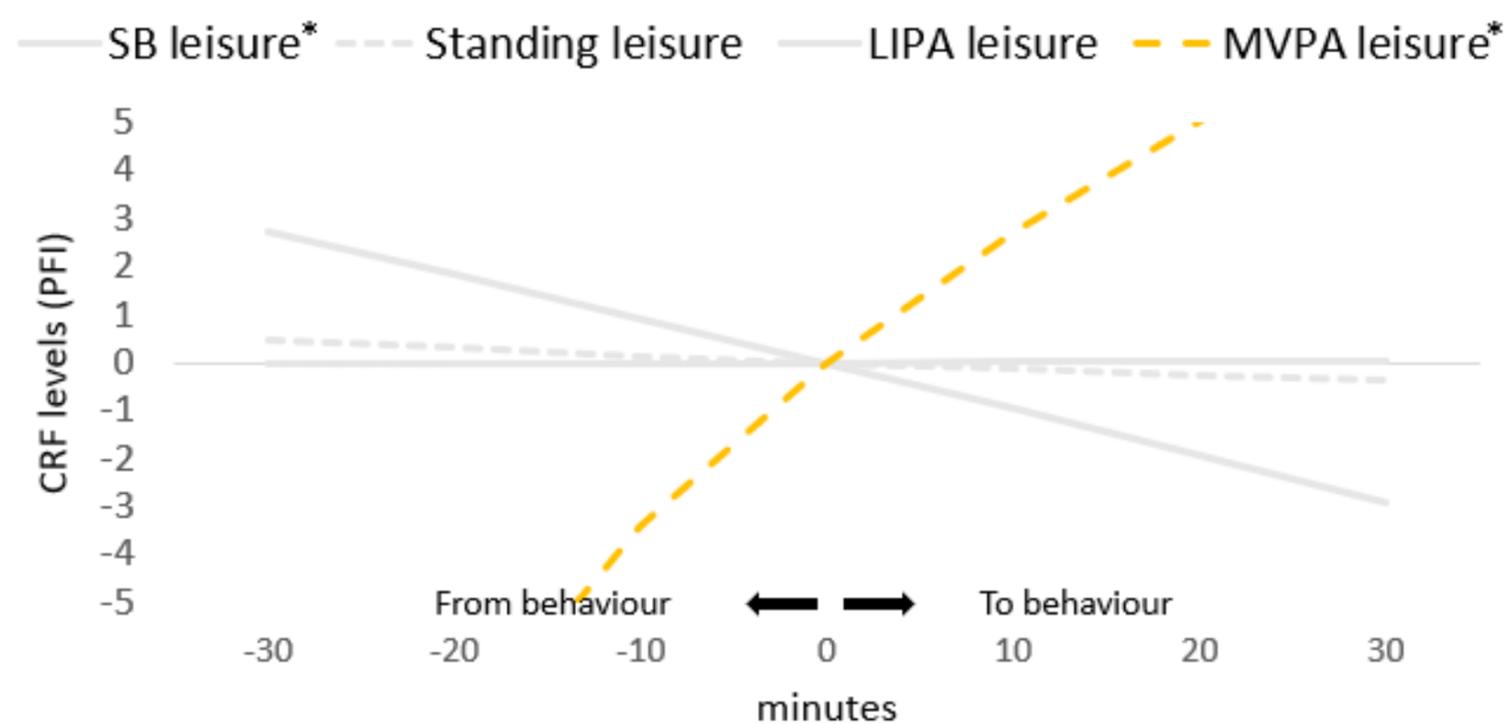
CRF levels

RESULTS: MVPA

a. Estimated difference in CRF of **work behaviours**



b. Estimated difference in CRF of **leisure behaviours**



CRF levels



MVPA

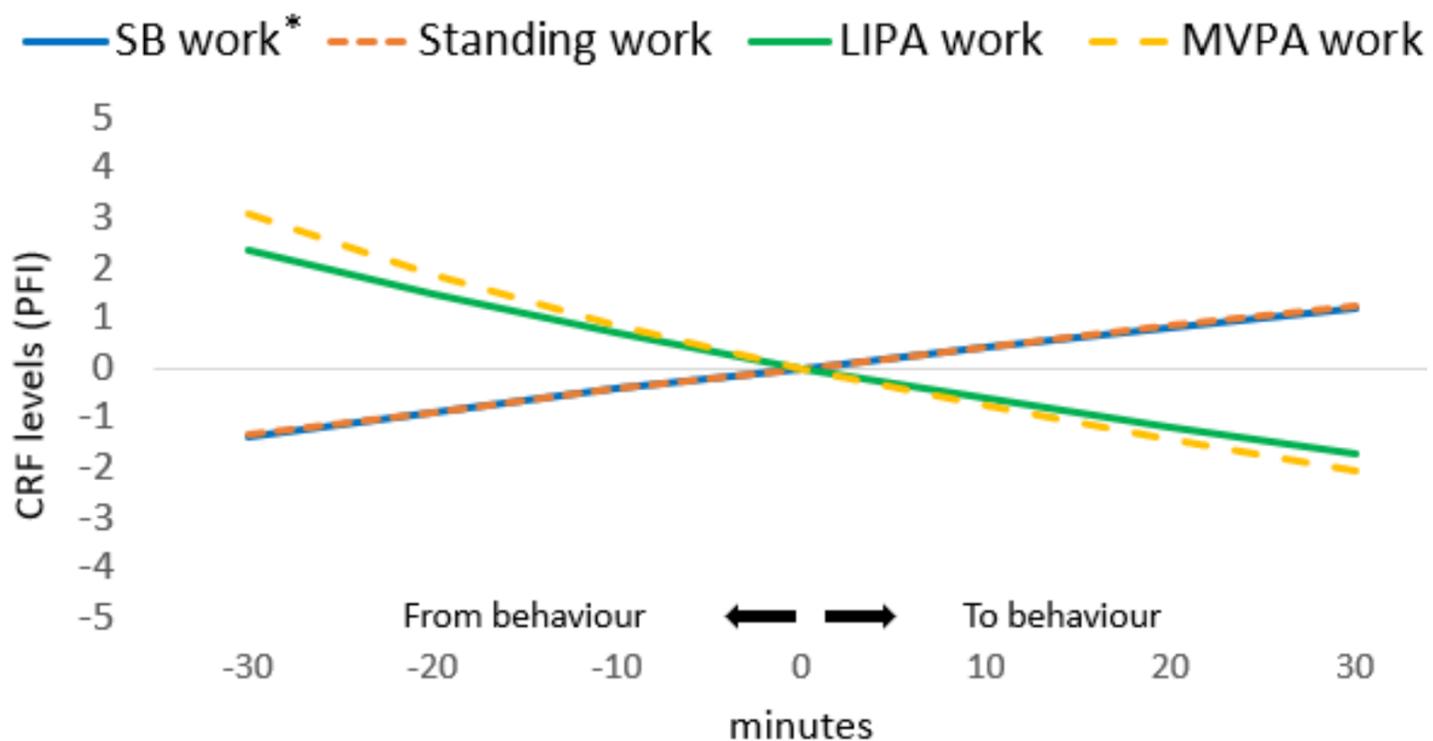


CRF levels

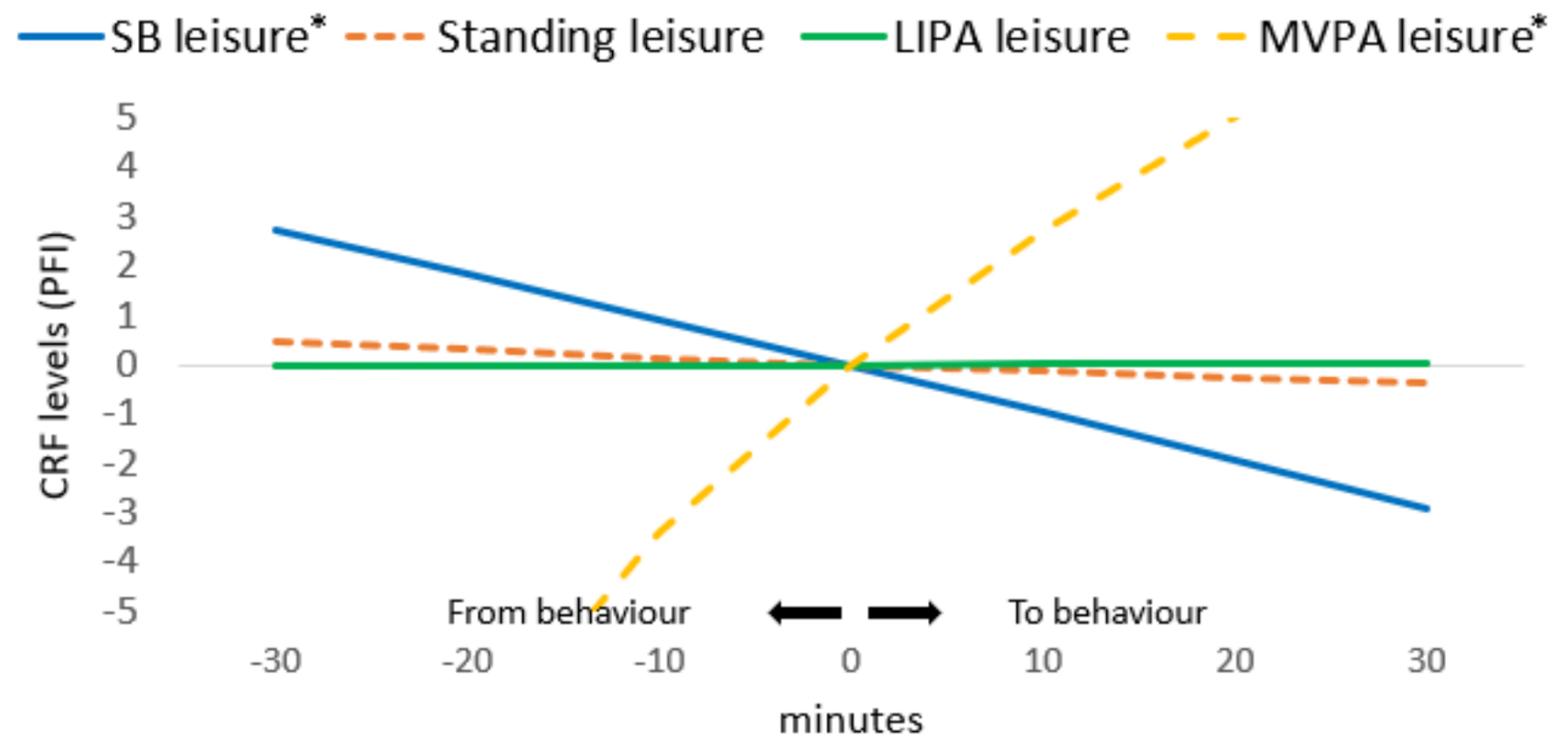


CONCLUSION

a. Estimated difference in CRF of work behaviours



b. Estimated difference in CRF of leisure behaviours



DISCUSSION: CHARACTERISTICS?



OPA	LTPA
Static load	Dynamic movements
30-35% of max aerobic capacity	60-80% of max aerobic capacity
Not voluntarily	Voluntarily
Long duration	Short duration
Insufficient recovery	Enough recovery



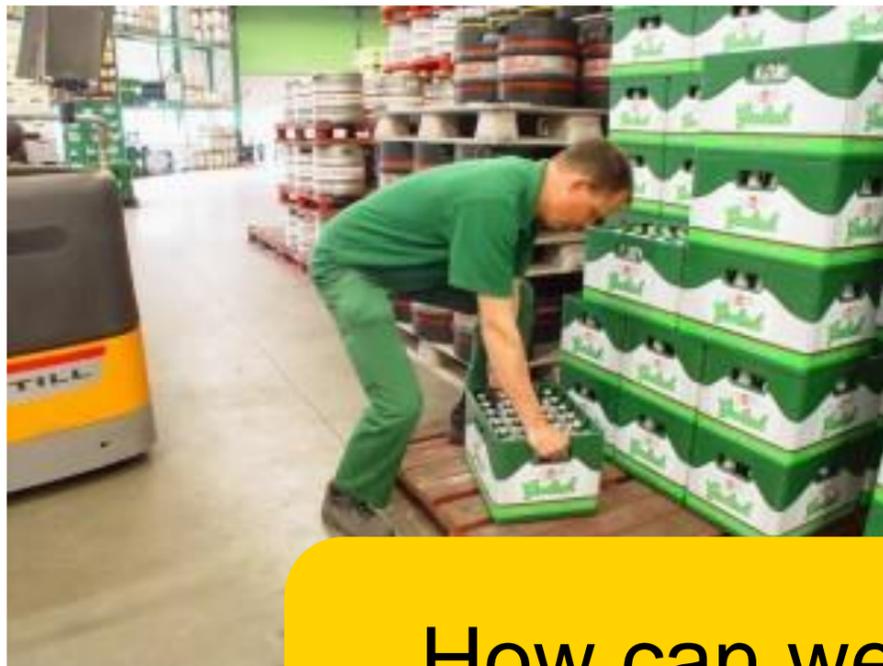
Cardiorespiratory fitness



CONCLUSION

- Important to differentiate between OPA and LTPA in future PA guidelines.
- In addition, highly relevant to take into account that our results relate to workers involved in **physically demanding jobs**. Guidelines for this group should be differentiated from workers with sedentary jobs.

! Recommend workers in physically demanding jobs to have **more rest breaks during their work**, which runs contrary to the general public health guidelines 'to sit less and participate more in MVPA'.



How can we mitigate the negative association between physically demanding work and health?



RESEARCH AIM 1



Sitting at work (X1)



Standing at work (X2)



MVPA at work (X3)

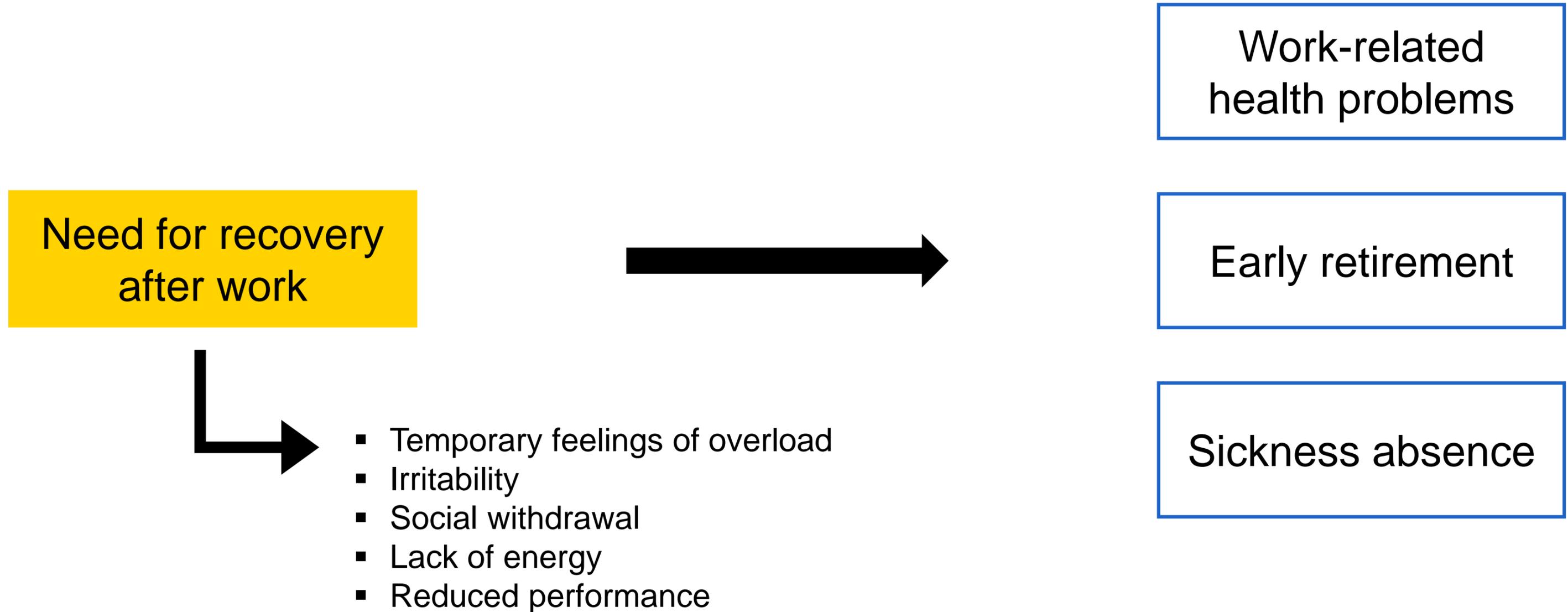


Physically demanding tasks (X4)



Need for recovery after work

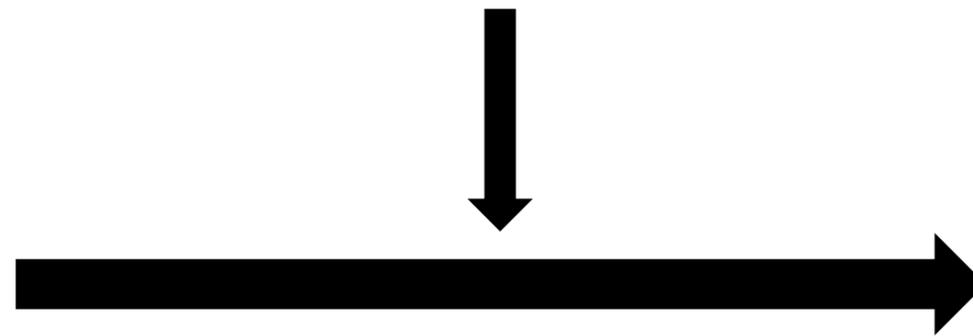
NEED FOR RECOVERY



RESEARCH AIM 2

Psychosocial work-related factors:

- **Job control & social support**



Need for recovery after work



Sitting at work (X1)



Standing at work (X2)



MVPA at work (X3)



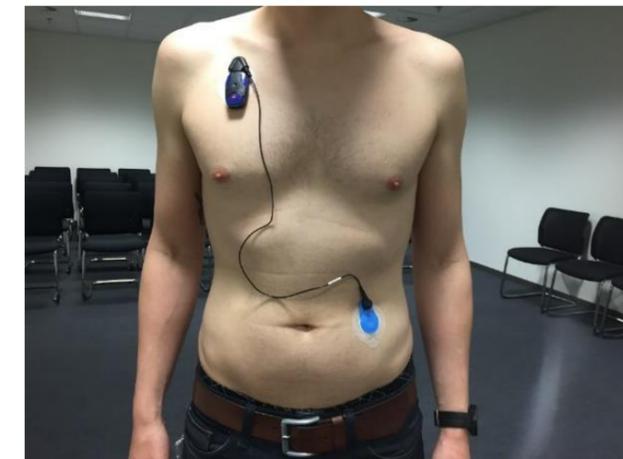
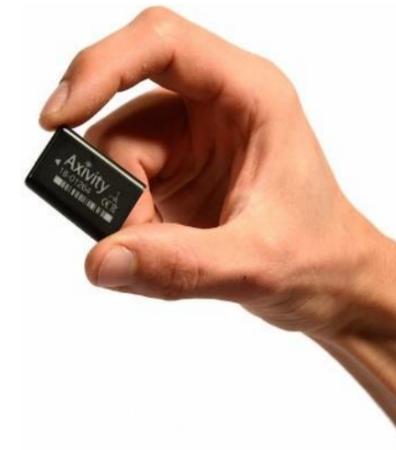
Physically demanding tasks (X4)

Adjusted for age, sex, job demands, work schedule, and self-perceived health

MEASUREMENTS

Total of 332 workers, including only workers with physically demanding jobs.

Questionnaire	Baseline screening	Objective measurements
<ul style="list-style-type: none"> • Need for recovery (11-items) • Psychosocial resources (JCQ) • Physically demanding tasks (JQC) • Confounding variables 	<ul style="list-style-type: none"> • Anthropometrics 	<ul style="list-style-type: none"> • Physical activity: accelerometers (sitting, standing, and MVPA)



RESULTS

Table 2.

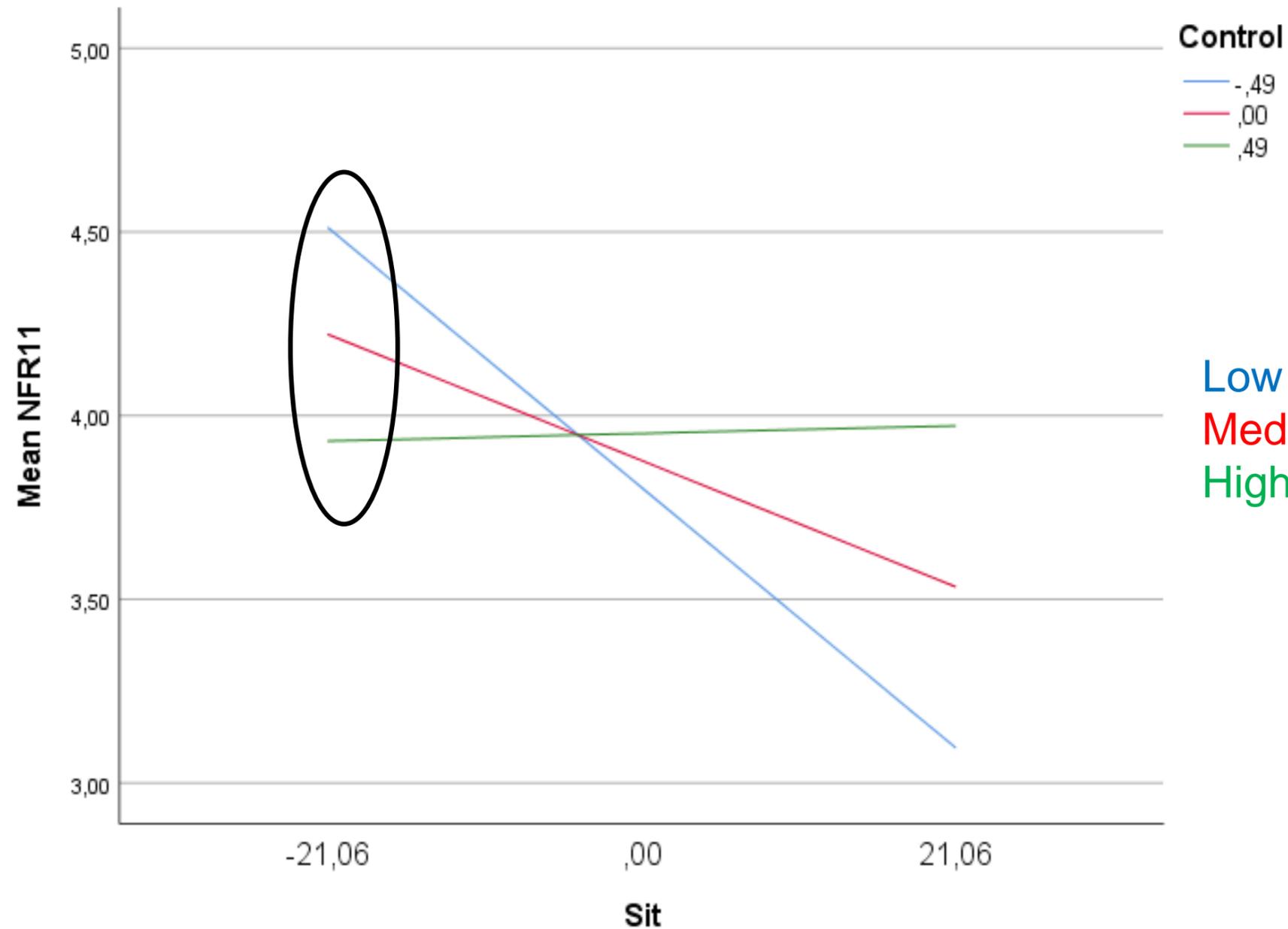
	Unadjusted model	Model 1 ^a	Model 2 ^b	Model 3 ^c
Sitting	$\beta = -0.03$; $p = 0.001$	$\beta = -0.03$; $p = 0.004$	$\beta = -0.02$ $p = 0.03$	$\beta = -0.02$ $p = 0.05$
Standing	$\beta = 0.04$ $p = 0.001$	$\beta = -0.02$ $p = 0.05$	$\beta = 0.02$ $p = 0.14$	$\beta = 0.01$ $p = 0.18$
MVPA	$\beta = 0.03$ $p = 0.29$	$\beta = -0.04$ $p = 0.08$	$\beta = 0.03$ $p = 0.27$	$\beta = 0.03$ $p = 0.26$
Physical work demands	$\beta = 1.85$ $p < 0.001$	$\beta = 1.7$ $p < 0.001$	$\beta = 1.33$ $p < 0.001$	$\beta = 1.17$ $p < 0.001$

^a Adjusted for age and sex

^b Adjusted for age, sex, work schedule, and job demands

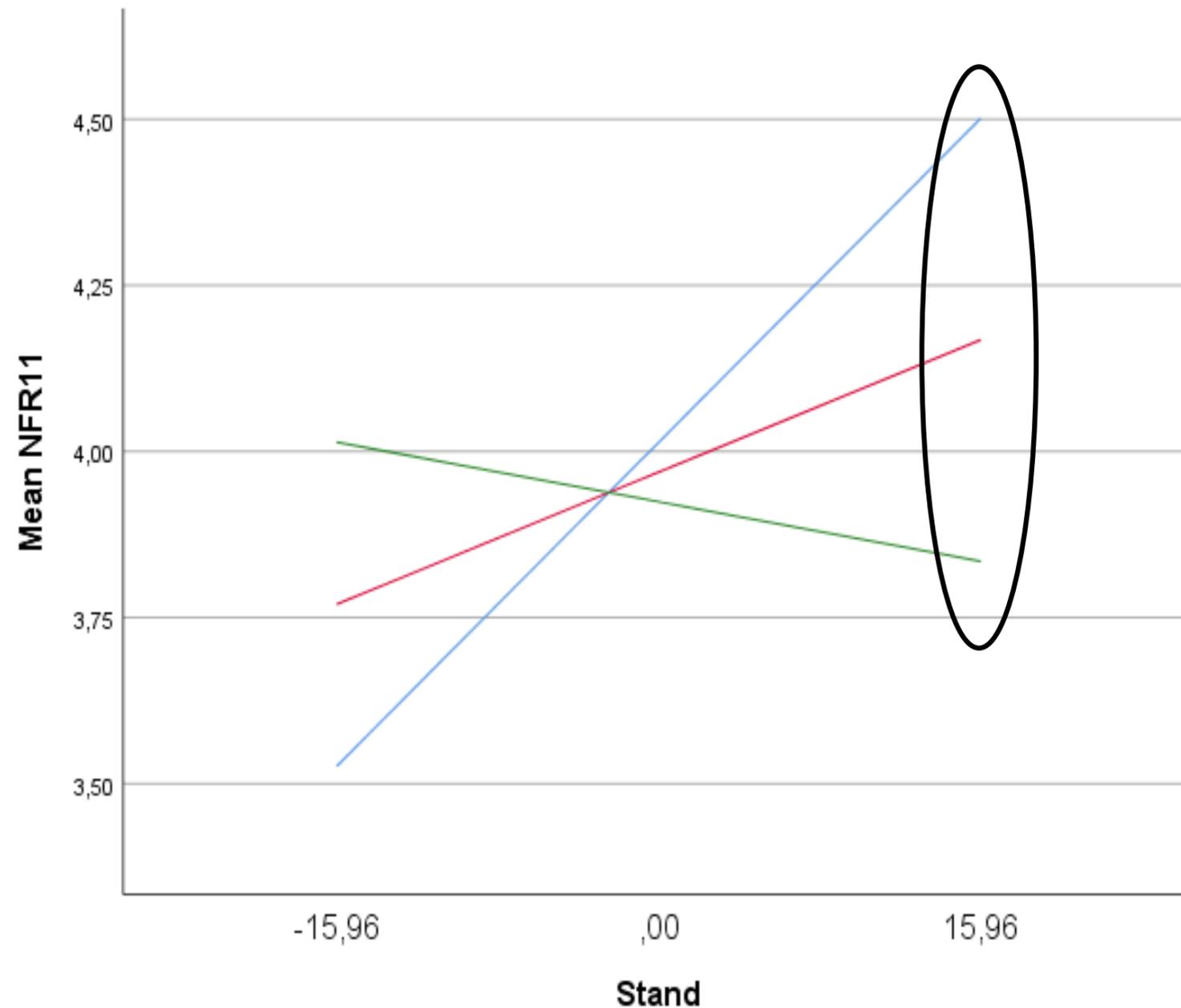
^c Adjusted for age, sex, work schedule, job demands, and self-perceived health

JOB CONTROL X SITTING



Workers with **low job control + sitting less** during work
 => more risk of having **high need for recovery**

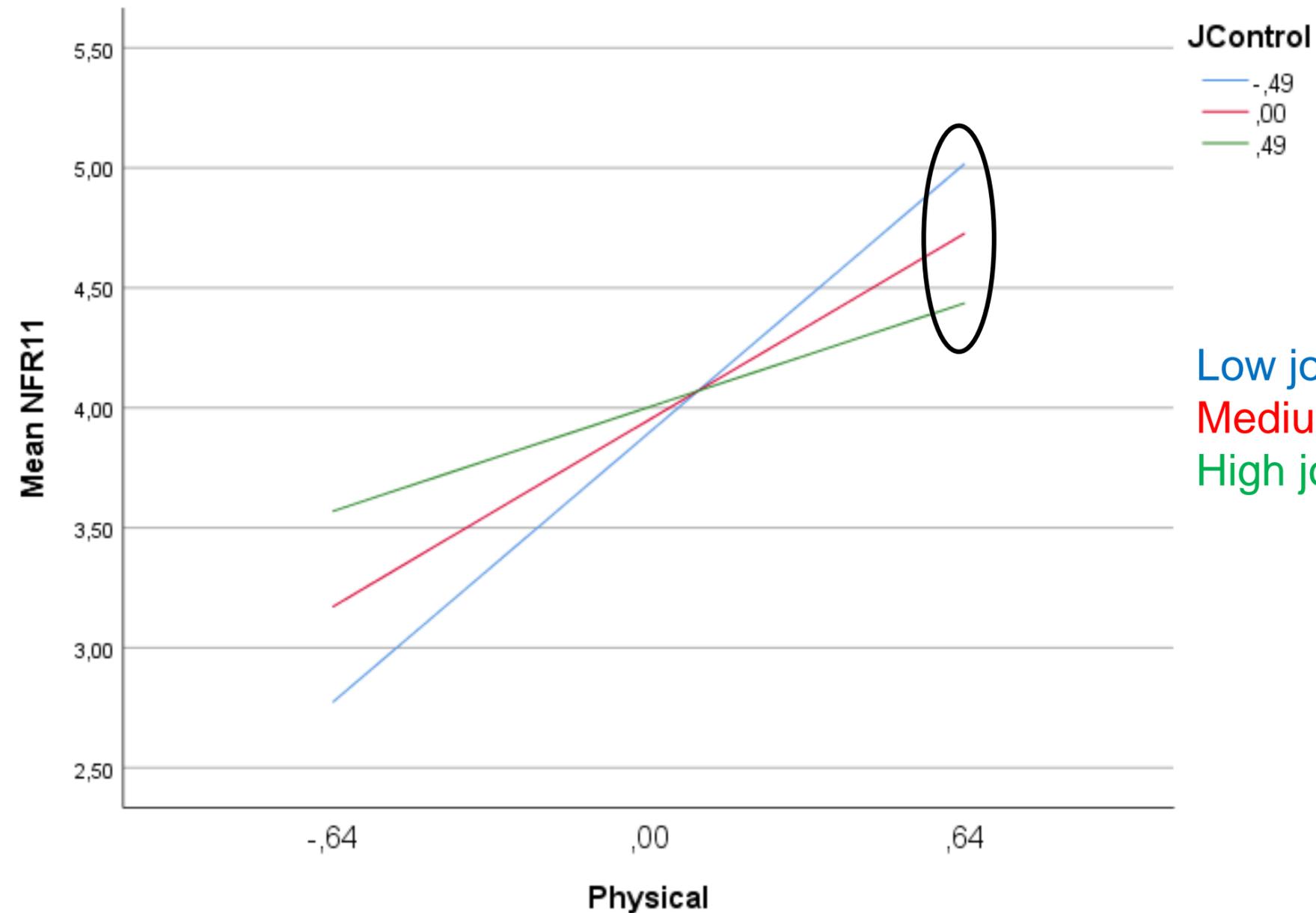
JOB CONTROL X STANDING



Low job control: $\beta=0,03$; $*p=0,04$
 Medium job control: $\beta=0,01$; $p=0,25$
 High job control: $\beta=-0,005$; $p=0,72$

Workers with **low job control + standing more** during work
 => more risk of having **high need for recovery**

JOB CONTROL X PHYSICAL TASKS



Workers with **low job control + more physically demanding tasks** during work
 => more risk of having **high need for recovery**

CONCLUSION

- Less sitting (i.e. breaks) and more physically demanding tasks associated with need for recovery.
- **Job control** as potential **buffer**, but **not social support**.
 - Importance of increasing job control to improve need for recovery
 - Prevention needed at the organisational level
 - More autonomy/flexibility for the workers: work schedule, rest breaks
- Limitation of cross-sectional data
 - Longitudinal data will be necessary before clear recommendations can be made.



CONCLUSION

- **Strengths** of this project
 - Objective measurements of OPA/LTPA: essential for avoiding self-reported bias
 - Relatively large sample size
 - Both men and women included
- **Limitations** of the baseline study
 - Cross-sectional design, does not allow to assess causality
 - Convenience sampling (selection bias)
 - Healthy worker effect
- **Further research** on the underlying mechanisms is needed
 - Longitudinal studies: **follow-up study!**
 - Objectively measuring of lifting/carrying: **ergonomic risk assessment**
 - Intervention studies (working together with many fields: ergonomics, psychology, economics, HR...)



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