

A cartoon illustration of a man in a suit sitting in a meditative pose, surrounded by various business and technology icons like a megaphone, smartphone, laptop, and clock, symbolizing multitasking or digital stress.



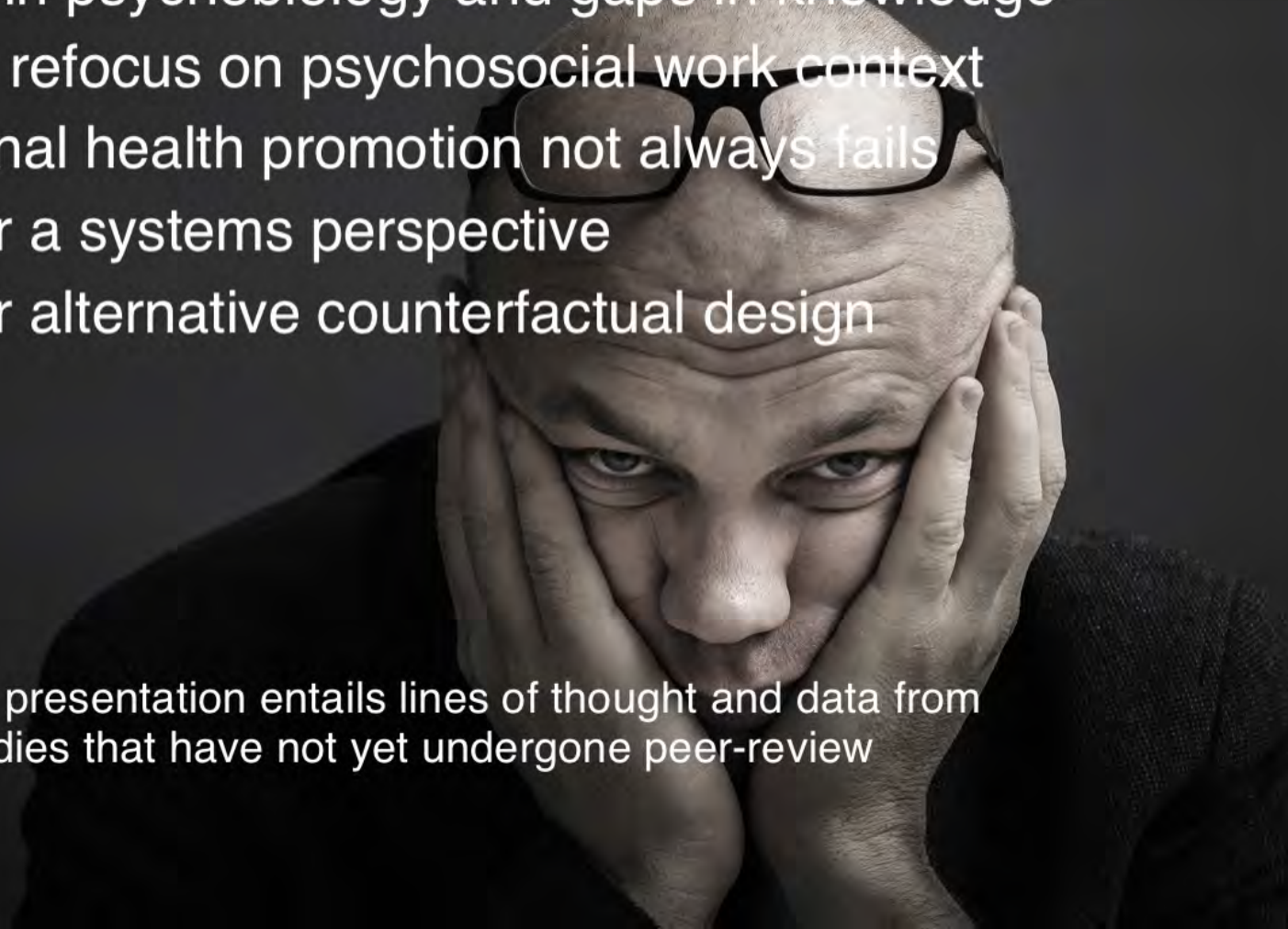
MIPH
Mannheim Institute of Public Health

Washington September 5th 2019

Outline

The concept of work-ability and engaged well-being
Our journey in psychobiology and gaps in knowledge
The need to refocus on psychosocial work context
Why traditional health promotion not always fails
The need for a systems perspective
The need for alternative counterfactual design

Disclaimer: This presentation entails lines of thought and data from unpublished studies that have not yet undergone peer-review



Disclosures

Ownership

HealthVision GmbH

High5Data GmbH

Business relationship

BMW Group was a key account for HealthVision GmbH

HealthVision GmbH provides data to Mannheim Institute of Public Health

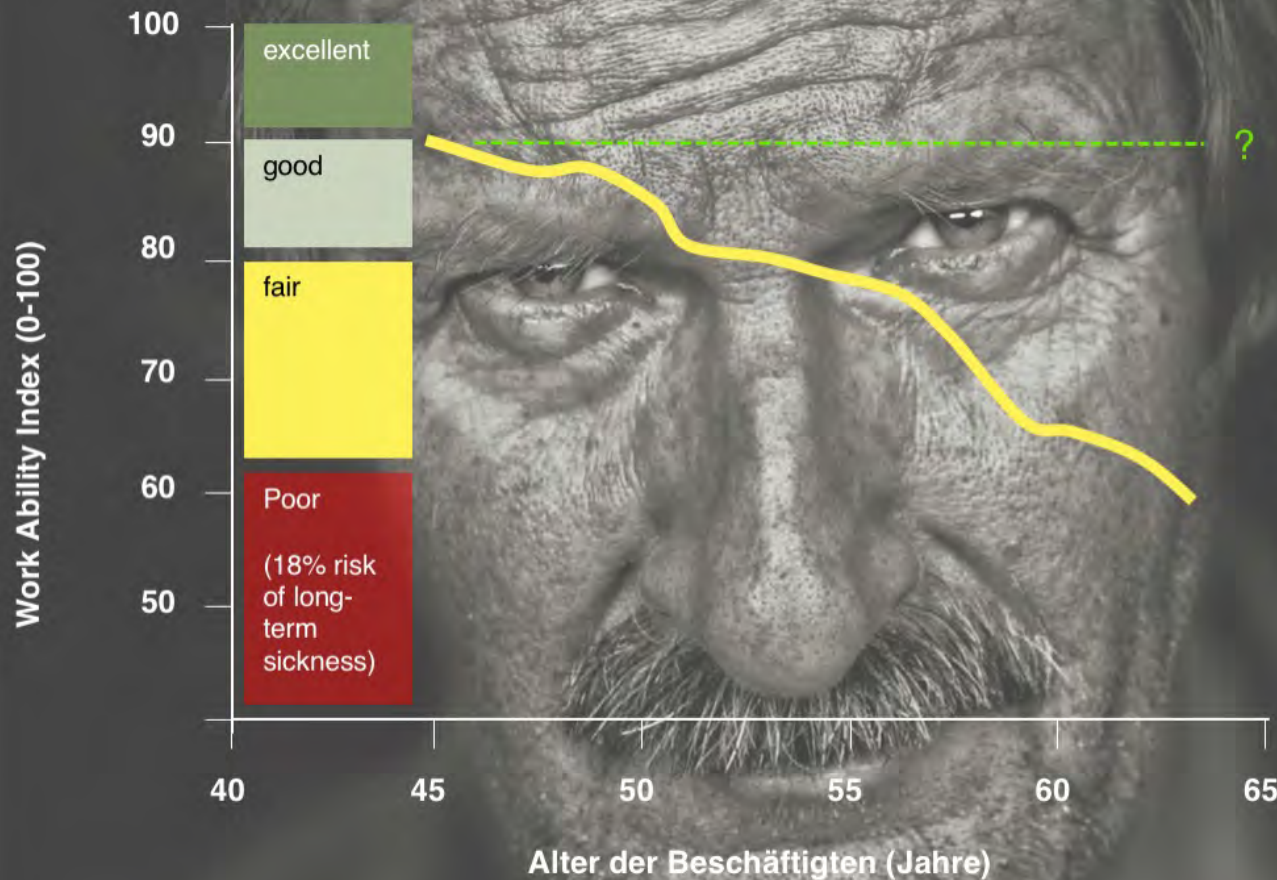
Consultation fees

AbbVie, Airbus, Allianz, BMW Group, Federal Ministry of Labor, Roche Diagnostics, Airbus, Villeroy & Boch...



Our journey: 1997-2019

Work ability and aging



Between 45 and 60
Decline of about 1,7% per year

Causes:
Musculoskeletal-Disorders
Depression & Burnout
Sleep problems
Chronic stress
Lack of purpose
Diabetes

Do nothing

Adapted from Tuomi/Ilmarinen People and Work Research Reports. Vol. 65. Finnish Institute of Occupational Health, Helsinki; 2004



Work-Ability

Self-reported measure

Conceptual Idea

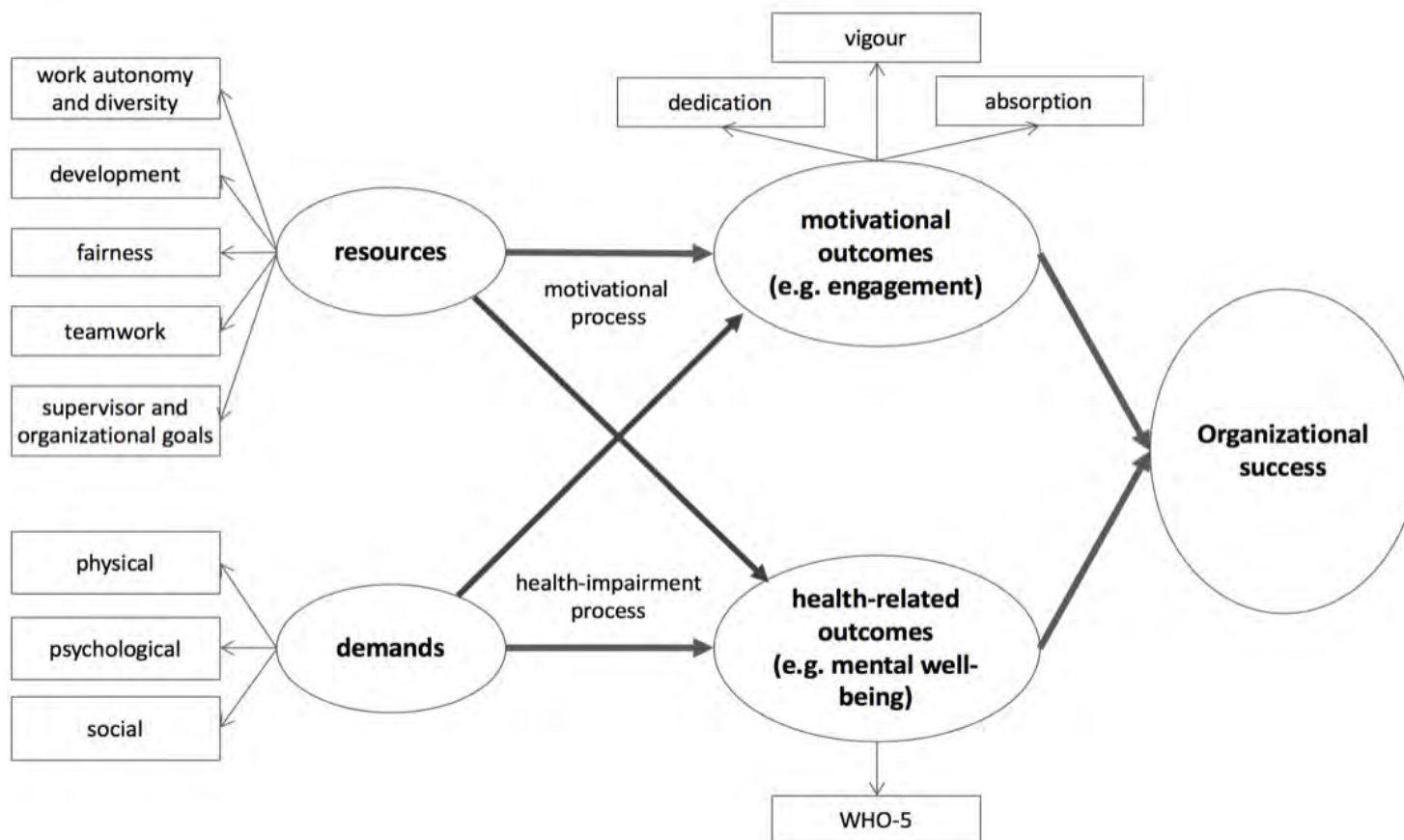
- Work-ability is a result of the interaction of four domains
- Health
- Competence
- Motivation
- Psychosocial and organizational work

Operationalization: 7 Domains – 22 items

- Current work-ability compared to best one ever
- Work-ability compared to demands
- Number of physician documented medical conditions
- Impact of health conditions on work-ability
- Sick-leave last 12 months
- Expected future work-ability considering current health
- Mental resources

Short form 5-8-items has sufficient psychometric characteristics

Engagement and Well-Being Conceptual model





Engaged well-being

Self-reported measure

Conceptual Idea

- Individuals who report mental well-being and who thrive on their work might have better health outcomes and might be retained longer in any type of work (paid, voluntary)

Operationalization: Bakker Schaufeli Engagement + WHO-5

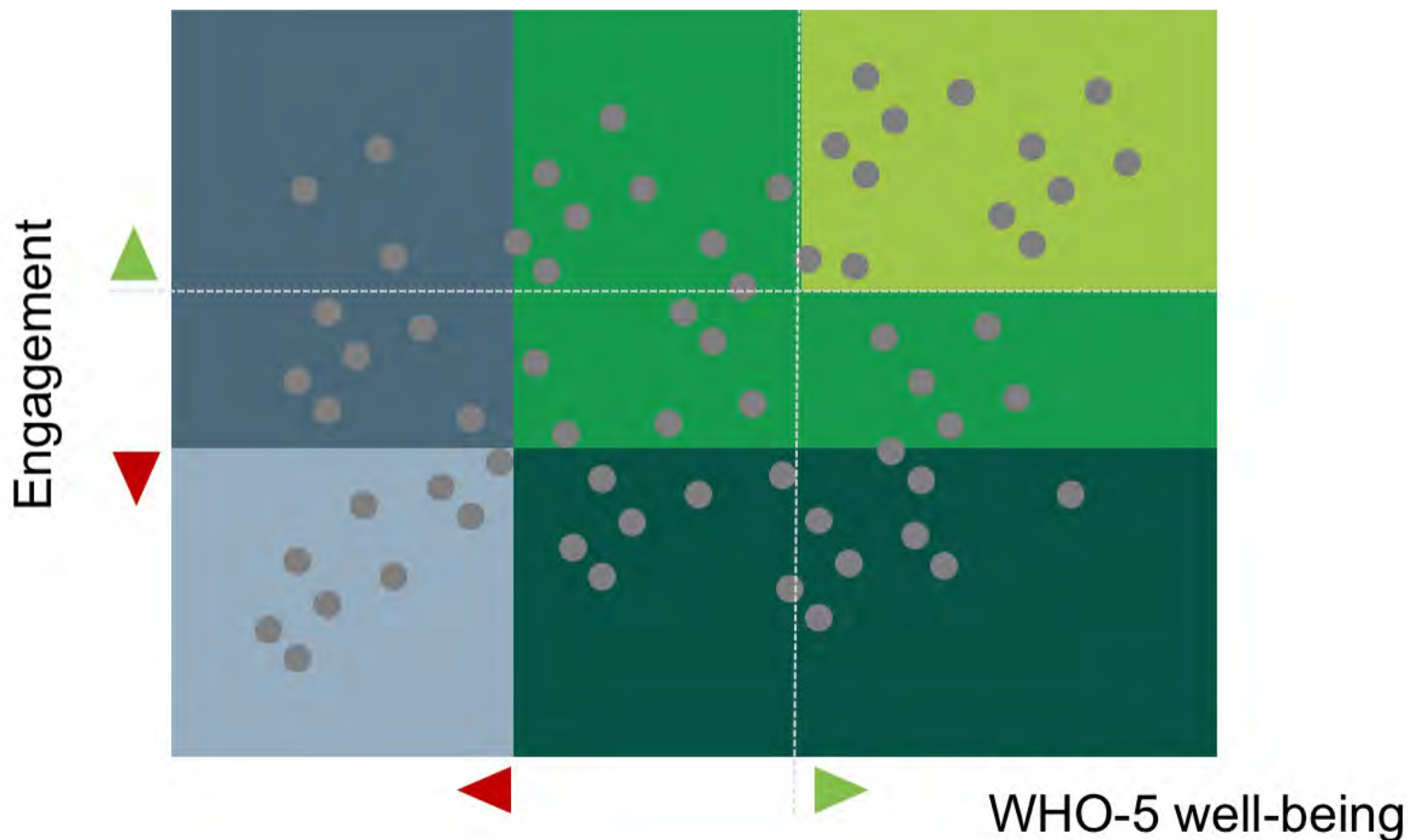
- At my work I am full of exuberant energy
- Working makes me feel fit and energetic
- I am enthusiastic about my work
- My work inspires me
- When I get up in the morning, I look forward to my work
- I feel happy when I work intensively
- I am proud of my work
- I am completely absorbed in my work
- I feel like being carried away by my work.

Impaired, well, excellent - cut-off (i.e. WHO-5 < 51), 0.5 SD above mean

Data

Three wave longitudinal representative study Germany

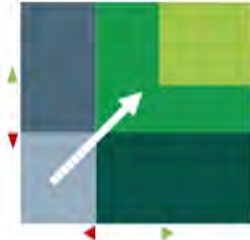
$N \geq 7000$ per wave



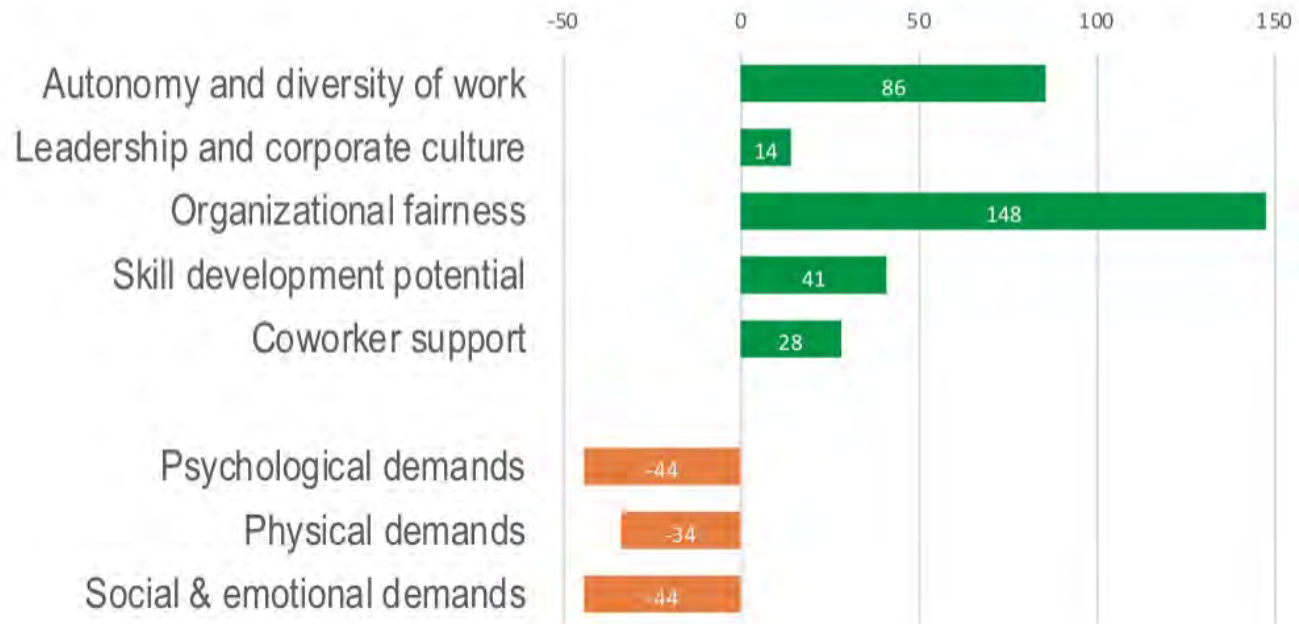
Data engaged well being

Three wave longitudinal representative study Germany

N ≥ 7000 per wave

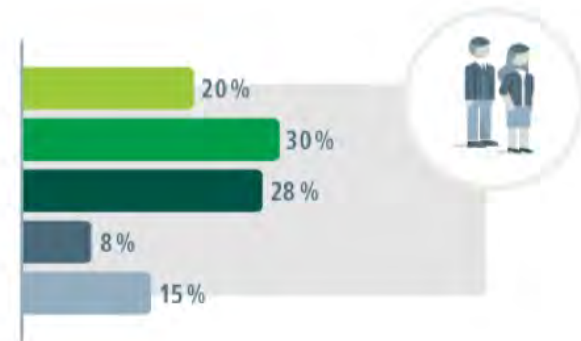
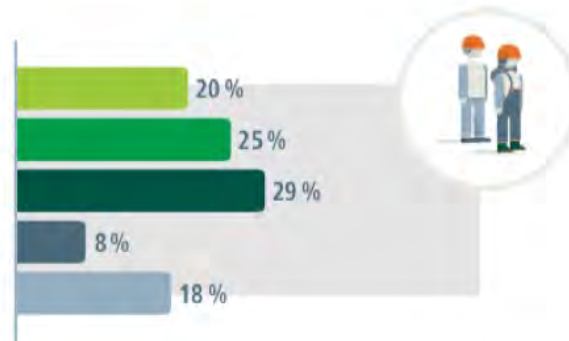


Change odds in % per 0.7-0.8 effect size





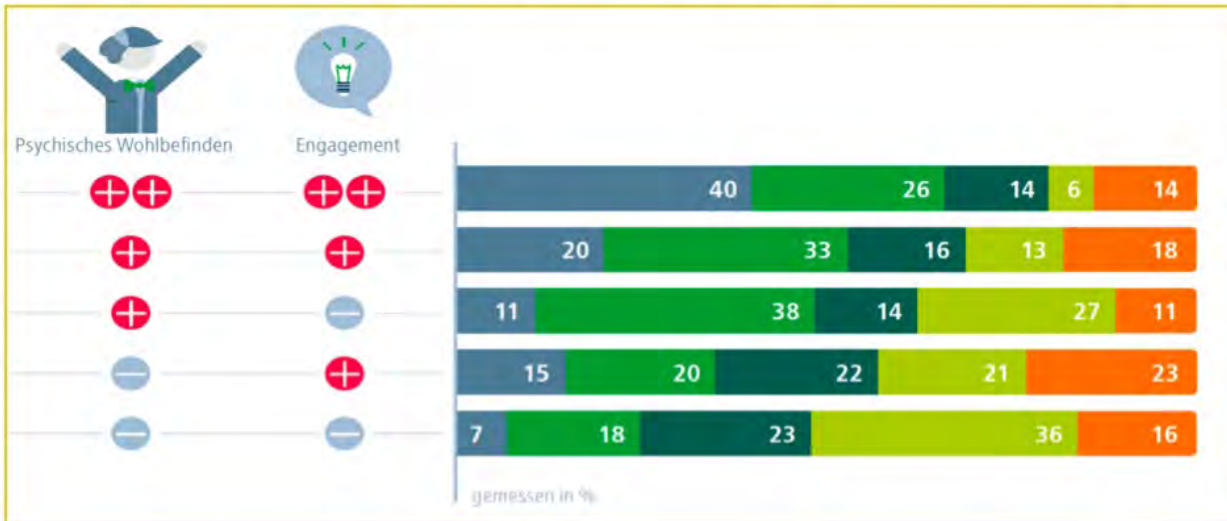
Age, Type of Work



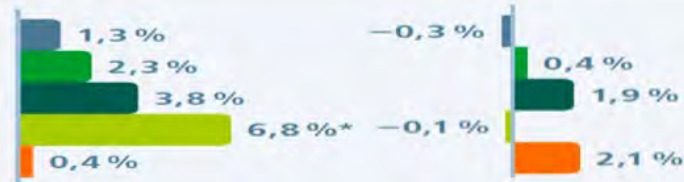
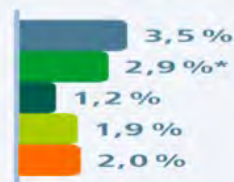
Personality and Differential Effect of Change

5 Typologies derived by Cluster Analysis from Big Five

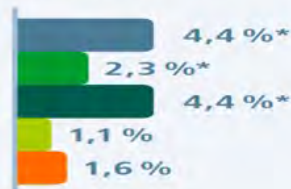
- Typ I: Inspirierende Macher
- Typ II: Koordinierende Netzwerker
- Typ III: Verlässliche Teamarbeiter
- Typ IV: Beobachtende Umsetzer
- Typ V: Interessierte Spezialisten



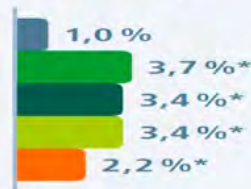
Change-Score Well-Being
(per 1 point increase on a 1-5 scale)



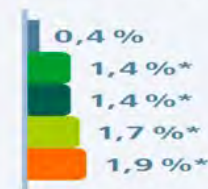
Fairness



Leadership



Skill development



Change-Score Engagement
(per 1 point increase on a 1-5 scale)

We kehrt for you



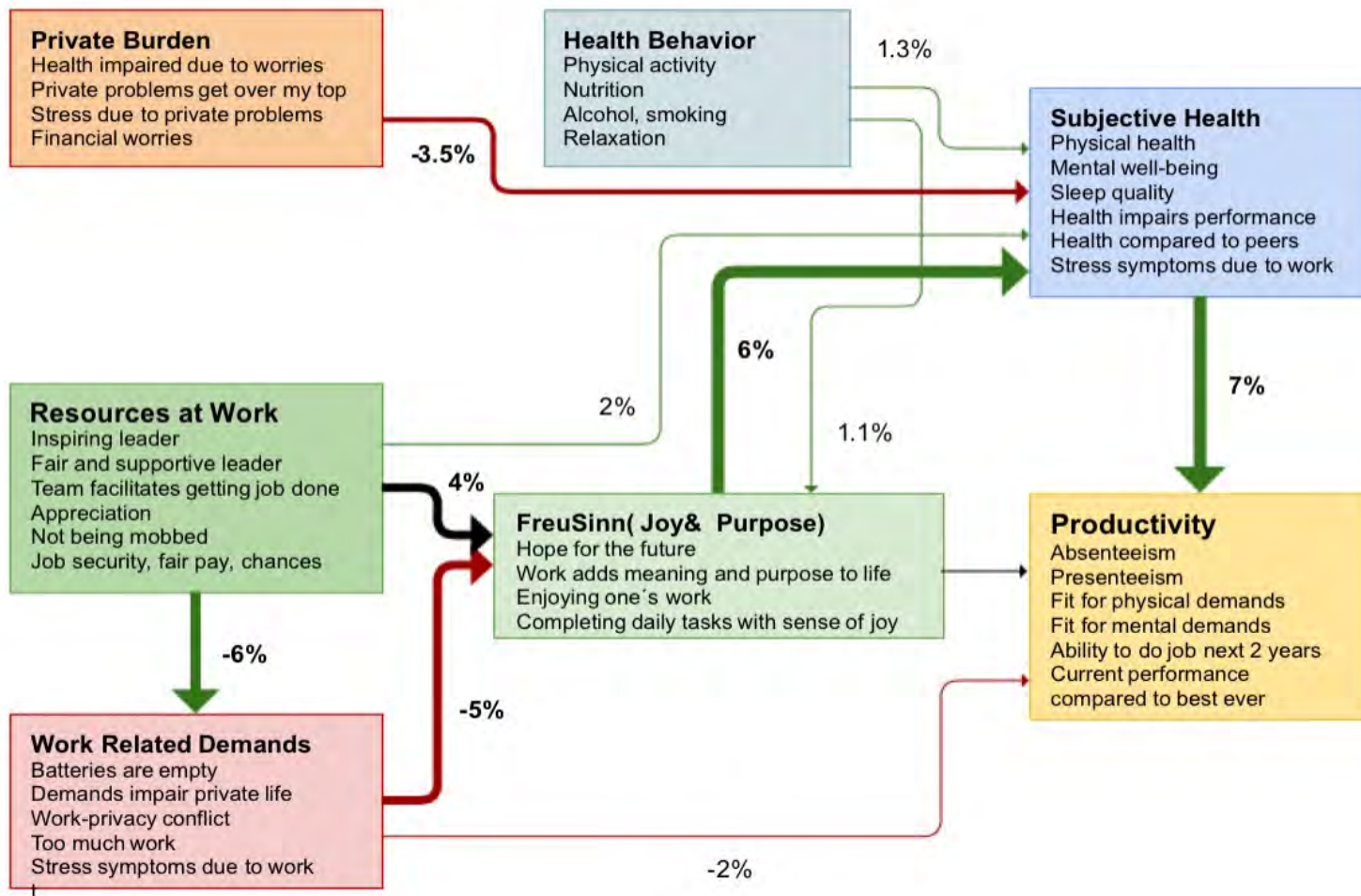
Wir bringen das in Ordnung

Joy & Purpose

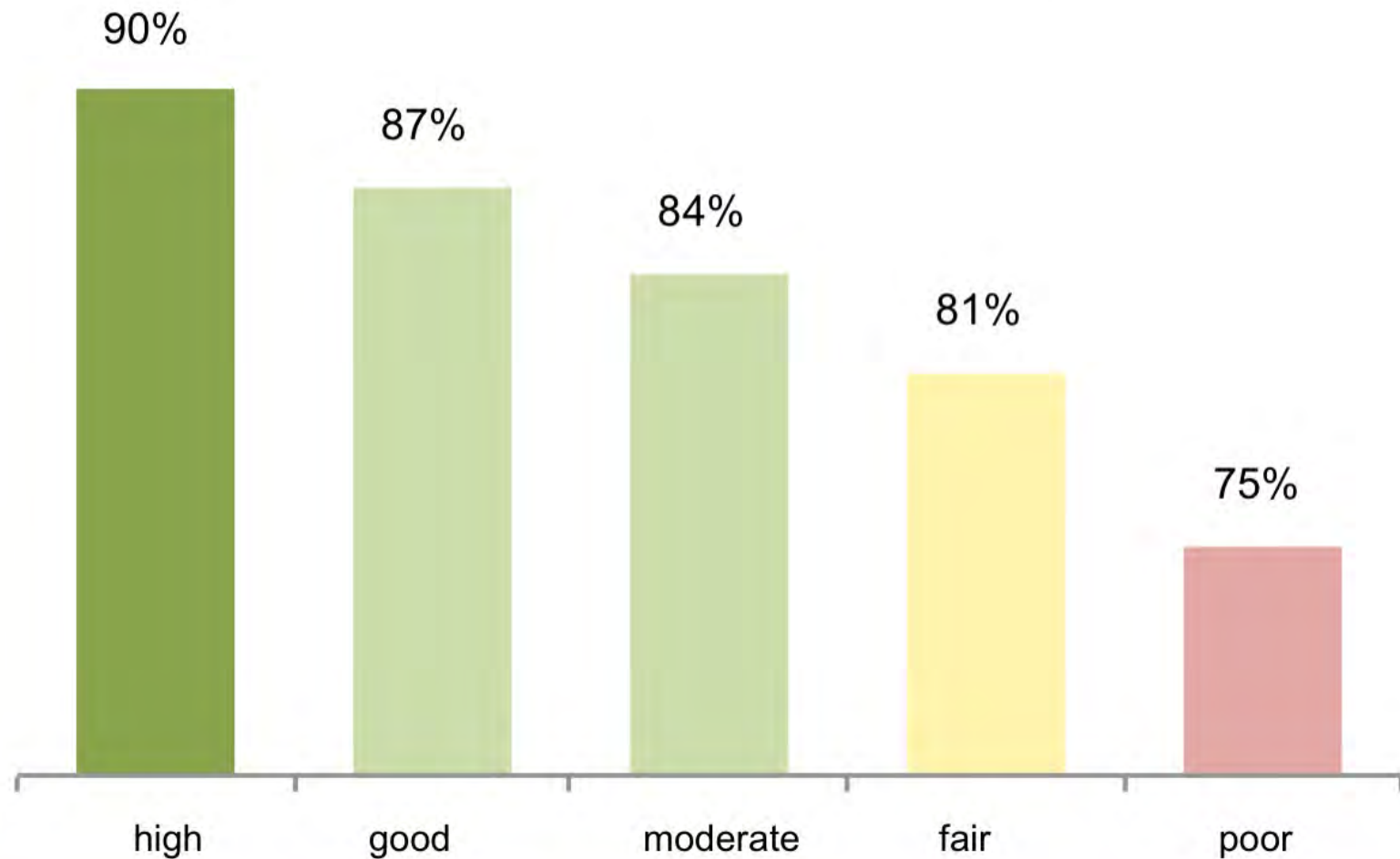


Pathmodel

Path annotation: change per 10% change in proximal factor



Work ability and perceived purpose (N=2084)



Changing Eating Behavior in Canteens for Good: Preliminary Results From A Multimodal Complex Intervention

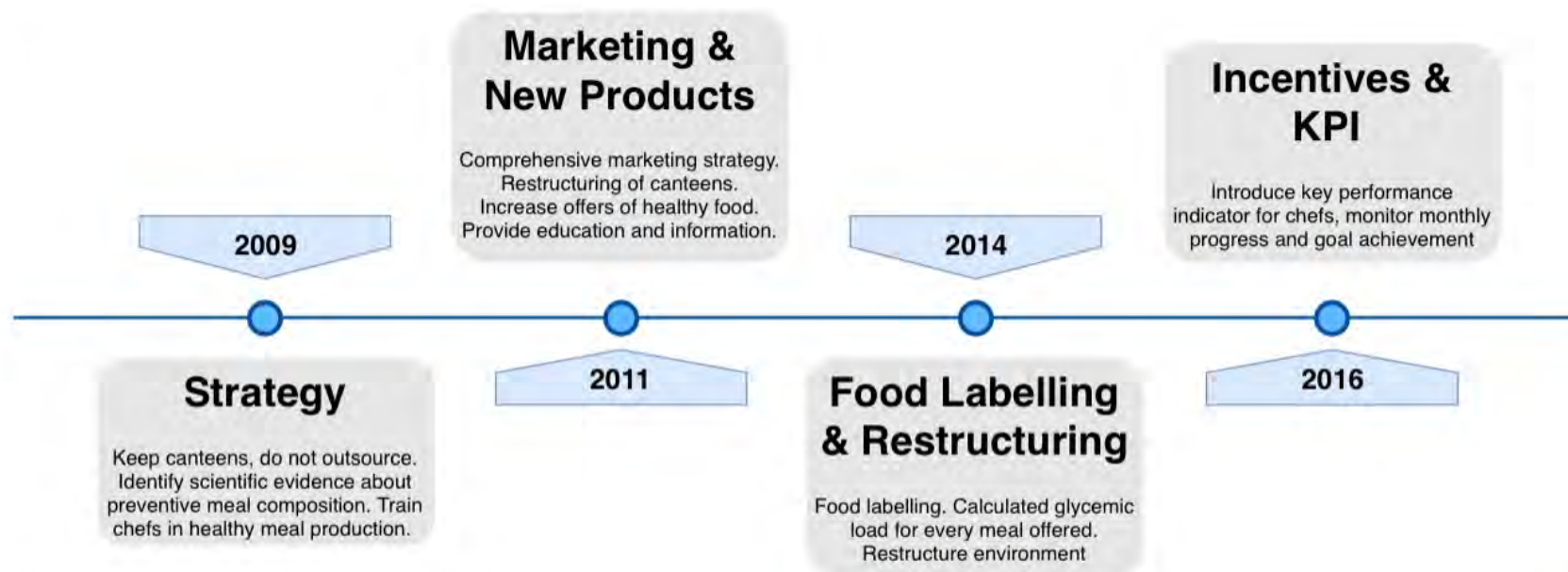
Joachim E. Fischer, MD,
Mannheim Institute of Public Health,
Heidelberg University, Mannheim,
Germany

**Oliver Jahns, Bernd Genser, Peter
Nauroth, Klaus-Peter Knoll**



Timeline of Intervention

Stepwise introduction – challenges for impact evaluation

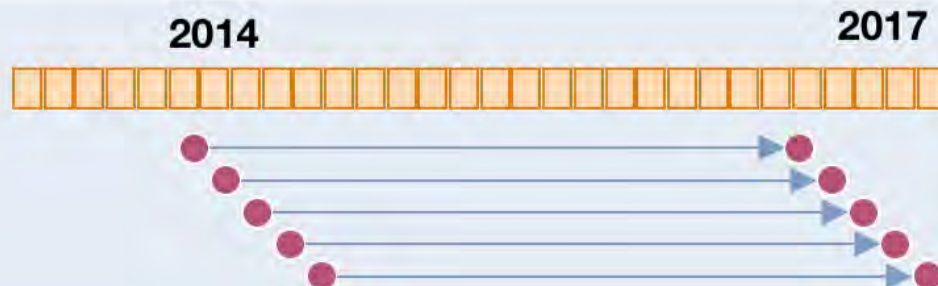


Measurement model

Canteen sales index

Individual health examination

Repeat measures n = 1354



Examples of Marketing Canteen meals

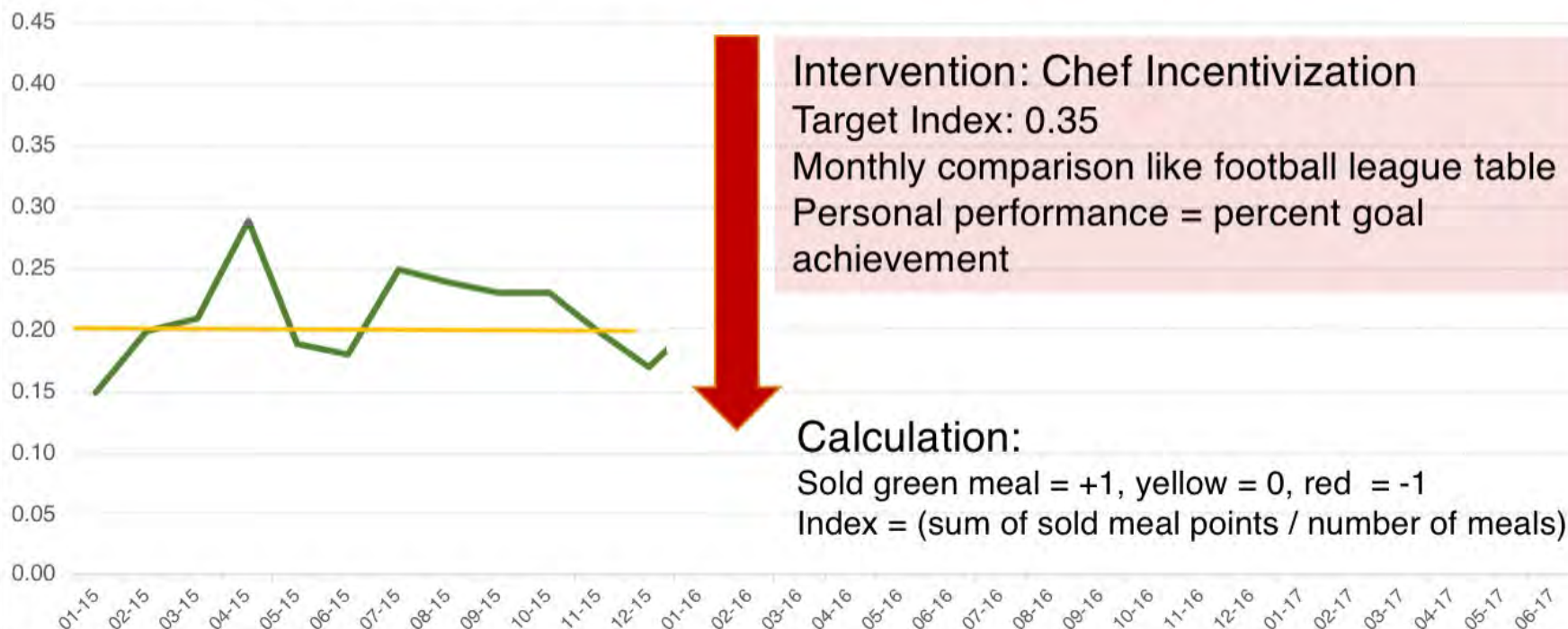


Change in Canteen Sales

BMW sites in Germany, target population n = 100.000

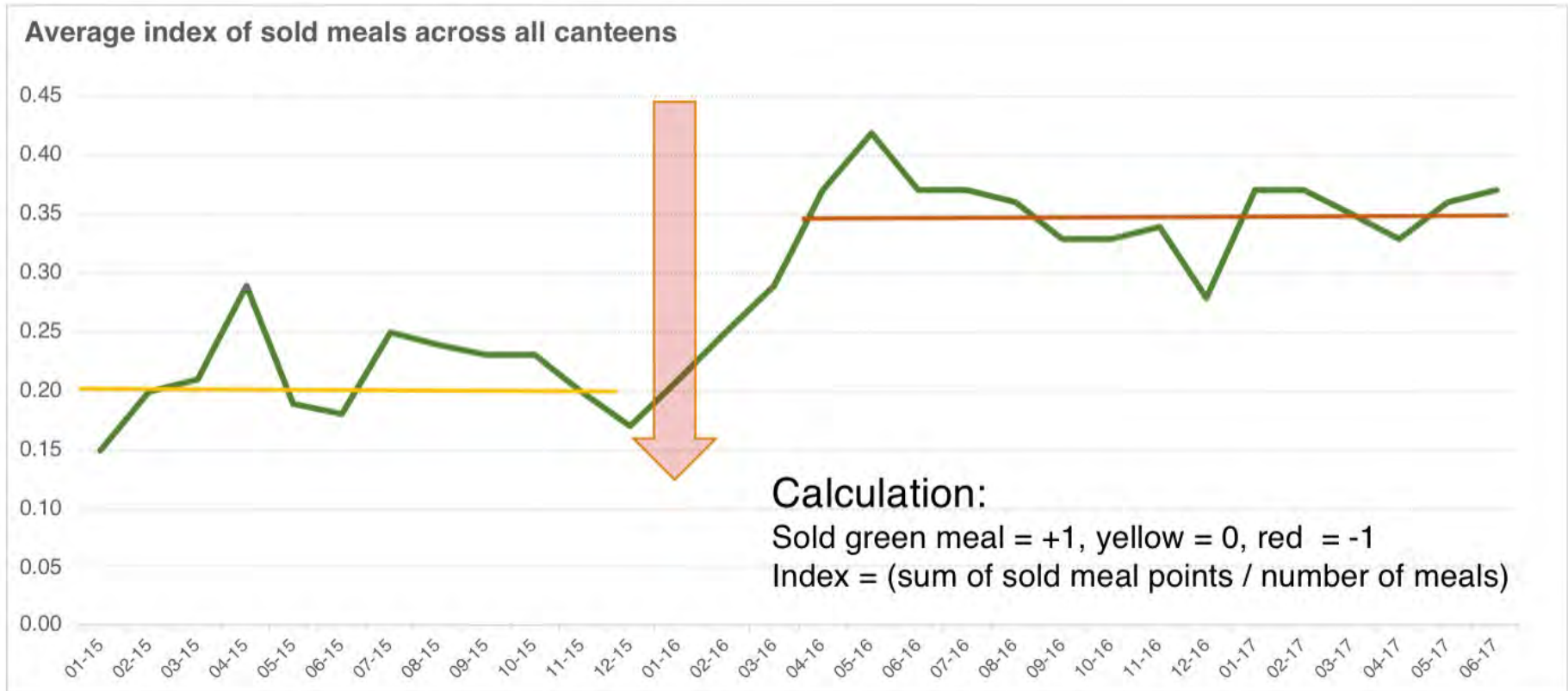
Part I

Average index of sold meals across all canteens



Change in Canteen Sales

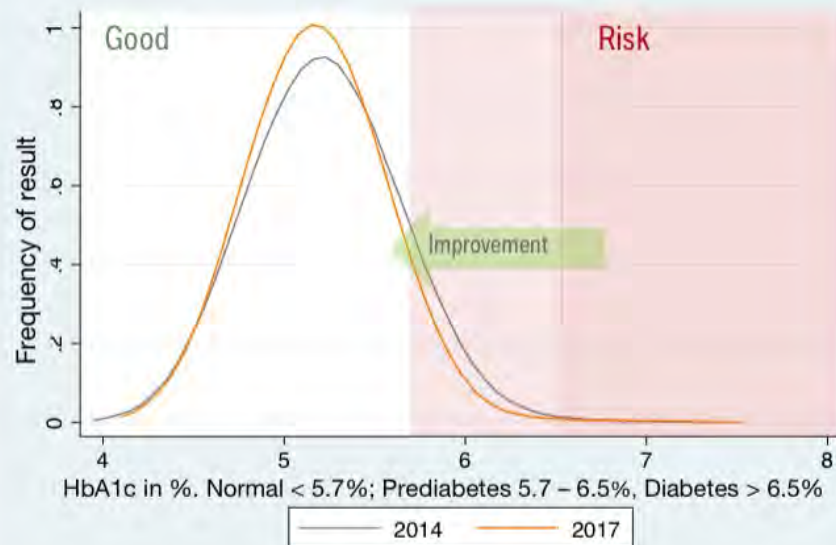
BMW sites in Germany, target population n = 100.000



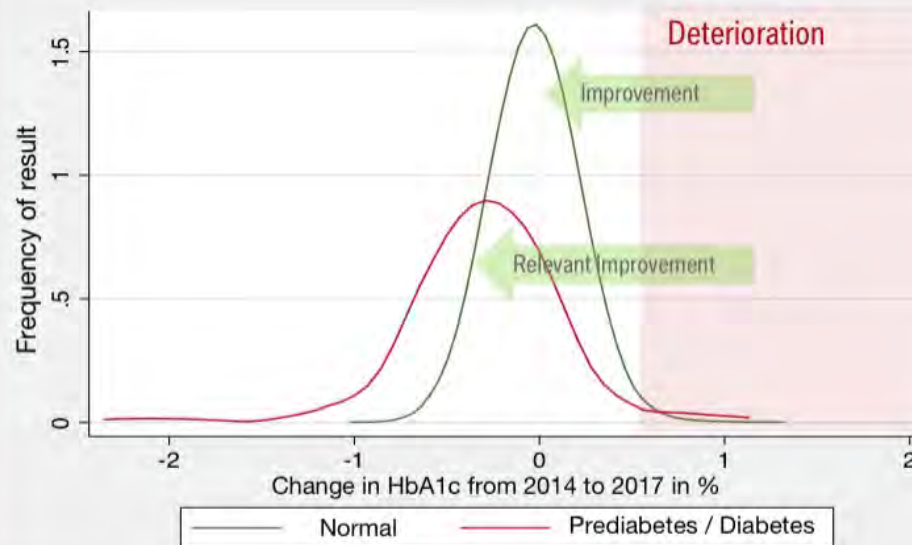
Effect on Hba1c Levels

Participants of health examination in 2014 and 2017 (n = 1,354)

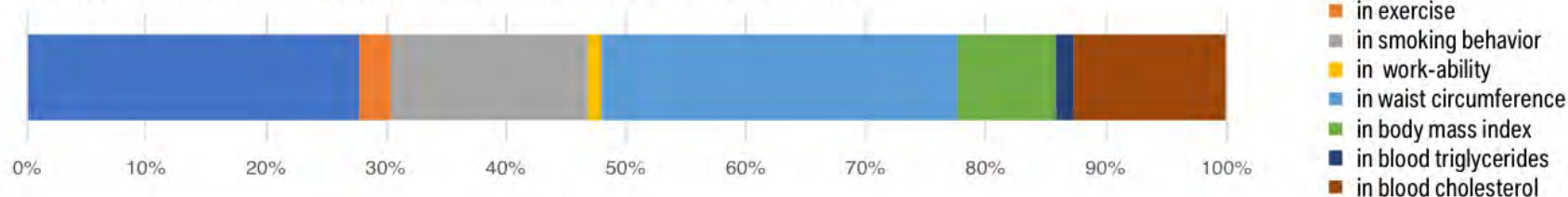
Repeat health examinations 2014 - 2017



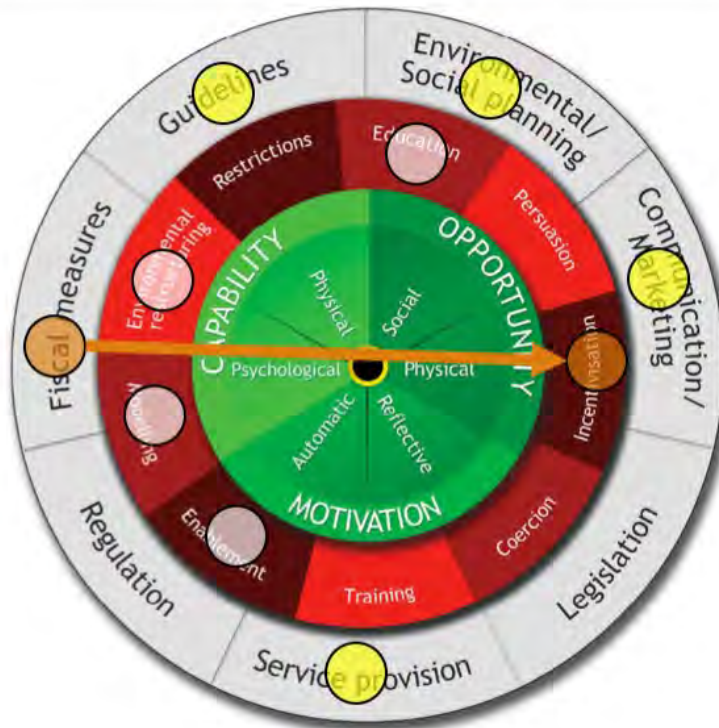
Stratified Analysis by Initial Value



Composition of explained variance in change scores



Change Behavior Research Context Model Review, Strengths & Limitations

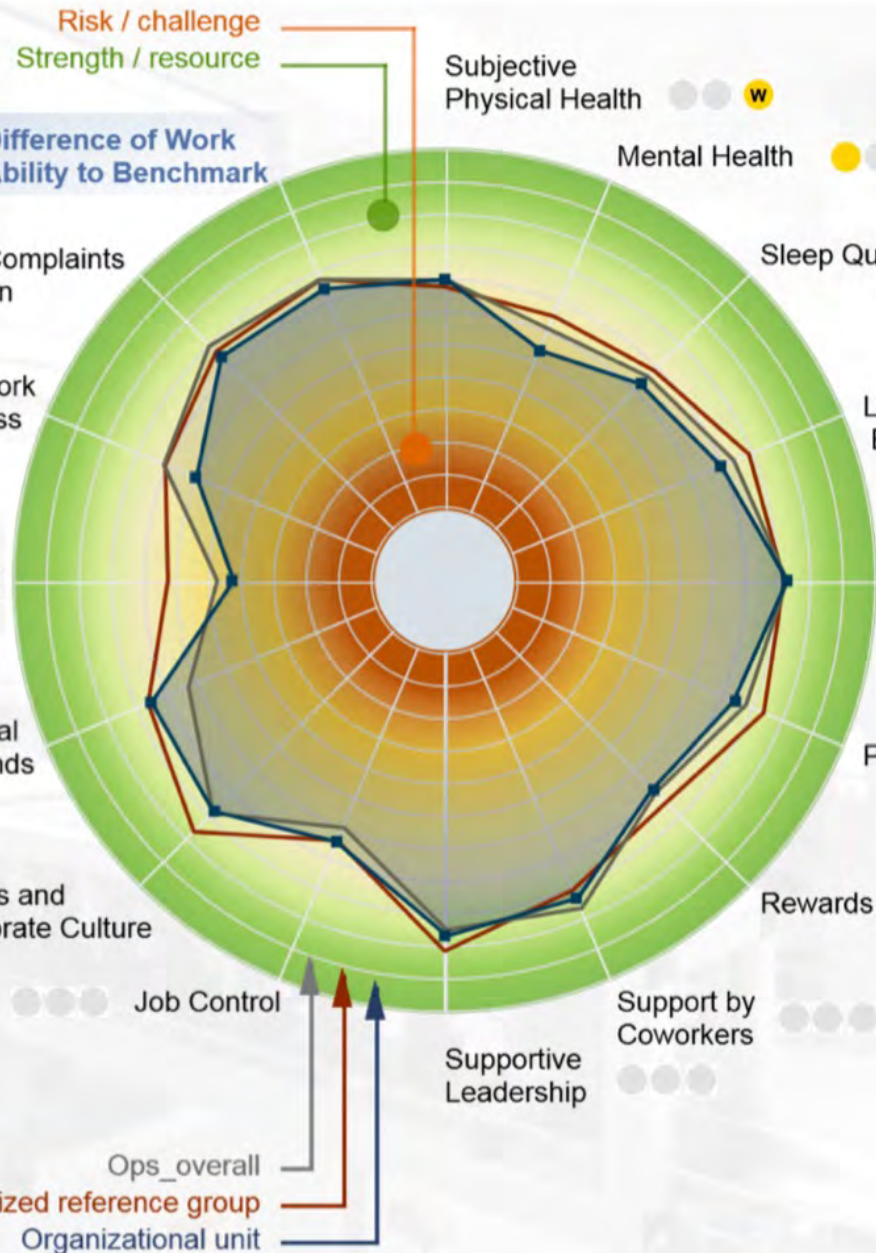


- Long term ecologically valid complex intervention
- Simple outcome measures
- Multilevel intervention
- Systems thinking: key nodes, incentivize them
- Longitudinal multi-site follow up
- Difficulty to decompose effect
- Selection bias “healthy worker”

Michie, S., Van Stralen, M. M. & West, R. 2011. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implementation science, 6, 42.

The need for an integrated systems based approach





Standardized reference group

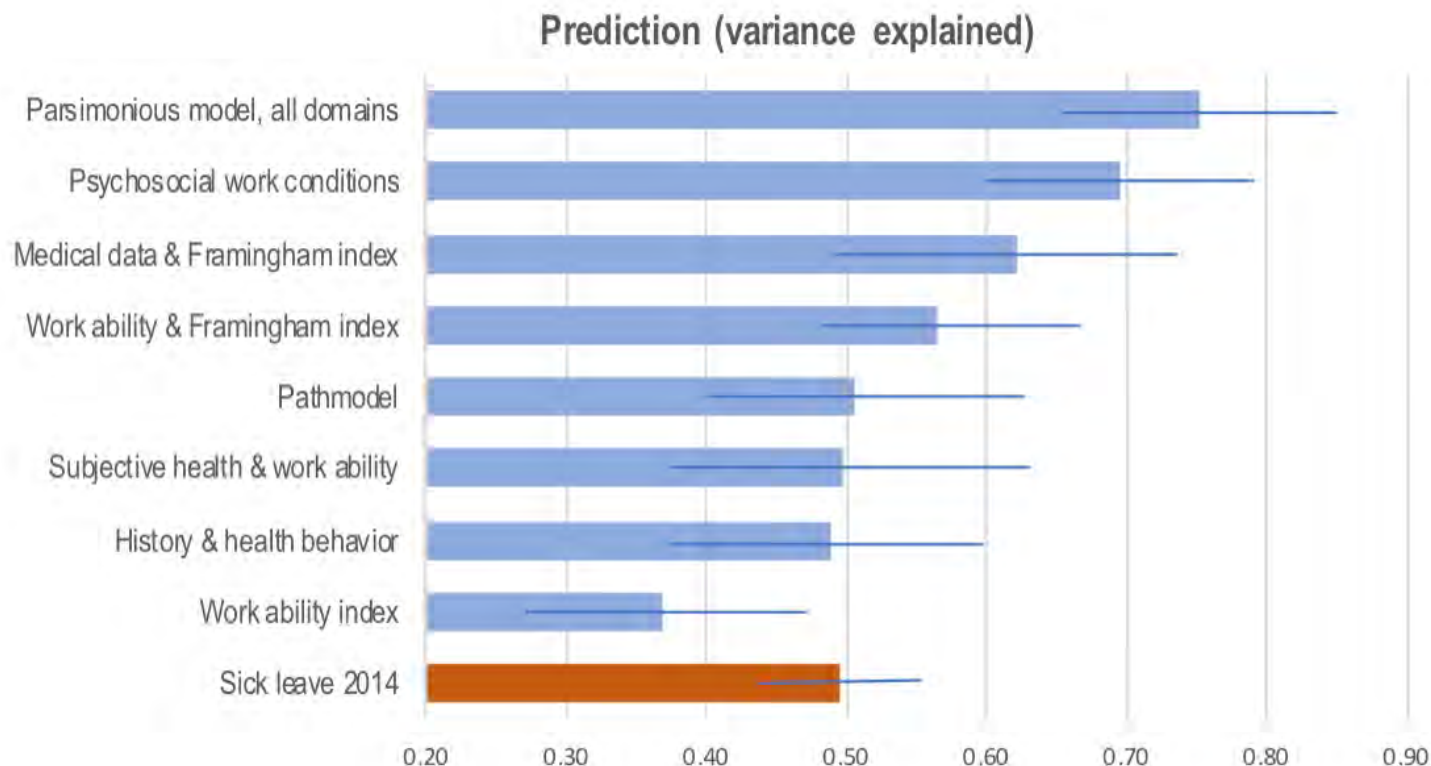
Organizational unit

Ops_overall

Heterogeneity and Patterns – Between Department Variation

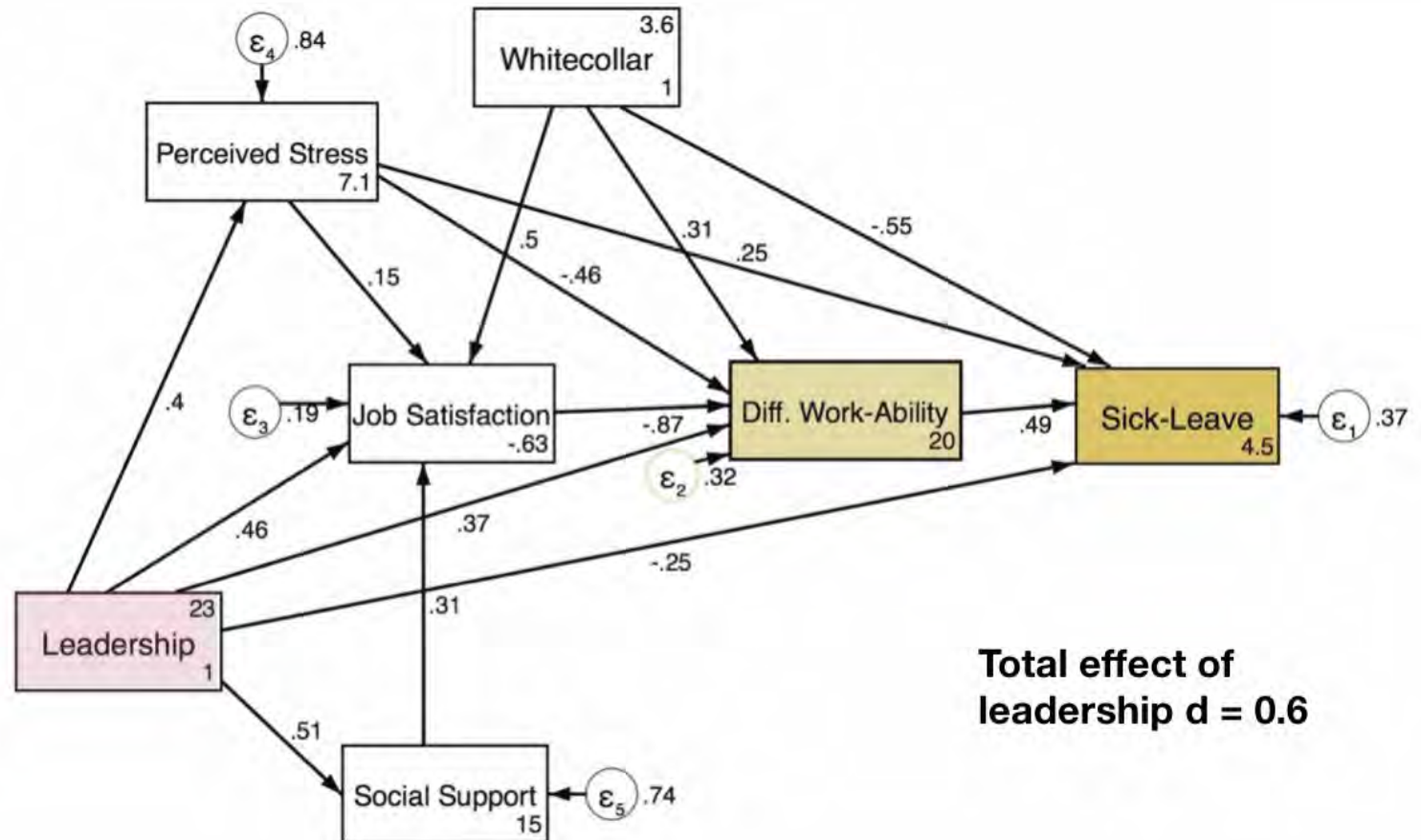
Demografy		KPI		Perceived Health									Personal Resources					Work Related Resources								Demands - Challenges							Health Behavior						
Number of Participants / Rate	Calendar Age	Gender	Health Related Loss Productivity		Perceived Health Index	Physical Health		Physical Complaints (past 4			Personal Resources Index	Life-Domain-Balance		Overcommitment	Self Efficacy	Social Network	Worries	Work Related Resources Index	Job Satisfaction	Rewards	Support by Coworkers	Supportive Leadership	Job Control	Job Skill Development	Values and Corporate Culture		Purpose	Identification	Job Demands Index	Quantitative Demands	Physical Demands	Demands Modern Technology	Cognitive Demands	Emotional Demands	Perceived Stress Index	Work Related Stress Perception	Health Behavior Index	Physical Fitness	Smoking
			Work Ability Index	Work Ability Index		Mental Health	Depression	Burnout	Sleep Quality	Life-Domain-Balance		Overcommitment	Self Efficacy												Social Network	Worries													
1310 (50 %)	41.9	***1.5	11.4	83.2	***10.8	10.1	11.5	10.8	***9.2	11.8	10.4	***9.9	11.4	10.5	10.3	11.6	12.8	12.4	11.3	11.7	10.4	12.0	12.1	9.9	11.9	11.6	11.1	11.4	***8.3	***8.2	11.0	9.8	9.7	10.3	11.2	10.1	***10.7	11.4	***13.0
392 (66 %)	40.6	***1.4	11.1	82.8	***10.6	10.0	11.6	10.9	***9.1	11.6	10.4	9.6	11.2	10.4	10.3	11.4	12.8	12.5	10.7	11.3	10.0	11.7	11.5	***9.0	11.3	10.9	10.7	11.1	***8.1	***7.8	***9.3	10.2	9.5	10.8	11.2	10.0	***10.4	11.4	***11.2
107 (69 %)	41.4	1.3	9.8	83.9	***11.0	9.8	11.9	11.6	9.8	12.2	10.8	10.3	11.5	11.4	11.2	11.7	12.5	13.0	10.4	11.5	9.9	12.1	11.0	***8.2	10.9	10.5	10.9	11.5	***8.4	***8.3	***8.6	10.6	9.8	11.6	***11.8	10.7	***10.5	11.6	***10.0
28 (65 %)	44.7	1.3	11.6	81.0	***10.6	***8.3	10.8	10.9	9.7	11.8	10.1	9.5	11.4	10.9	11.3	11.4	12.4	13.0	10.0	11.8	9.8	12.0	11.0	***6.8	10.1	10.4	11.1	11.7	***8.6	***8.7	***7.2	11.2	11.0	12.6	12.1	11.4	10.6	10.8	***10.2
39 (64 %)	35.8	1.2	***5.5	86.9	***11.7	10.9	12.5	12.4	10.0	12.6	11.6	10.7	12.2	13.1	12.5	12.5	12.8	13.3	10.6	11.8	10.2	12.1	11.0	9.2	11.0	10.6	11.2	12.2	***8.5	***8.8	***8.0	11.5	9.4	12.1	12.5	11.2	10.3	12.0	***8.8
38 (78 %)	44.1	1.4	12.0	82.7	10.6	9.8	12.0	11.2	9.5	11.9	10.4	10.3	10.9	10.1	9.6	10.9	12.4	12.8	10.7	11.2	9.8	11.9	11.2	8.8	11.2	10.5	10.5	10.7	***8.1	***7.4	10.1	9.2	9.3	10.5	11.0	9.7	10.2	11.4	10.9
48 (64 %)	39.9	1.1	14.8	80.5	10.3	10.6	11.9	10.3	***8.3	11.1	9.8	9.0	10.8	***9.2	9.4	11.6	12.8	11.8	10.4	10.2	9.3	10.8	10.6	9.6	12.0	9.5	9.8	9.7	***7.1	***6.8	***9.3	6.5	***8.5	***9.6	10.5	9.2	***10.0	11.9	11.3
22 (52 %)	39.5	1.0	12.6	82.1	10.7	10.7	12.0	10.7	9.0	12.0	10.1	9.3	10.9	10.2	11.2	11.6	12.5	12.3	11.0	10.5	9.7	11.5	11.3	9.8	12.1	10.2	10.2	10.2	***7.1	***7.2	***8.1	9.1	8.7	10.5	11.4	10.5	***9.7	12.2	***10.4
26 (79 %)	40.3	1.2	16.6	79.0	9.9	10.5	12.0	10.0	***7.5	10.4	9.4	8.8	10.5	***8.1	***7.7	11.7	12.9	11.5	9.7	9.7	8.9	9.8	10.0	9.3	11.7	9.0	9.3	9.4	***6.8	***6.5	10.5	***7.8	***8.1	***8.6	***9.5	***8.3	10.3	11.5	12.1
10 (91 %)	42.2	1.4	14.1	81.7	10.2	10.1	12.4	11.1	8.4	10.3	9.3	9.3	10.3	***8.0	***6.9	12.1	12.2	11.6	9.8	9.3	9.4	9.9	9.9	8.8	10.5	8.9	9.1	8.2	9.8	8.0	12.5	8.5	8.9	8.7	9.6	8.5	10.8	12.1	14.8
100 (65 %)	38.3	***1.4	9.8	85.0	***11.0	9.9	11.7	11.5	9.7	11.9	10.8	9.7	11.6	10.8	11.0	11.5	13.2	12.9	11.0	11.6	10.4	12.3	12.2	8.7	11.2	11.6	11.1	12.2	***8.1	***8.4	***8.4	11.1	9.9	11.3	11.8	11.0	***10.1	11.7	***10.4
22 (50 %)	40.0	***1.5	8.1	83.6	10.8	9.1	11.2	11.0	9.9	11.6	11.1	9.2	12.0	11.4	11.5	12.2	13.1	13.0	11.3	12.2	10.3	13.0	12.9	***7.8	10.9	12.4	11.1	12.4	***7.9	***7.9	***7.4	11.5	10.0	12.4	12.0	11.3	10.3	10.1	11.6
34 (87 %)	35.4	1.4	9.5	84.0	***11.1	10.2	11.9	11.5	9.6	11.9	11.3	10.0	11.3	10.9	11.0	10.2	13.1	12.7	11.1	12.1	10.4	12.3	11.5	8.3	11.6	11.4	11.3	12.3	***7.7	***8.2	***8.0	11.3	9.6	10.6	11.6	10.9	***10.0	12.4	***8.9
26 (57 %)	38.4	1.2	5.2	88.0	***11.3	10.4	12.5	12.6	10.0	12.5	10.6	10.3	11.7	10.6	11.4	12.2	13.1	13.3	11.3	11.5	10.7	12.2	12.5	9.5	10.8	11.9	11.2	12.1	***8.4	9.4	***7.9	11.6	9.7	12.1	12.3	11.7	10.4	12.8	10.1
18 (72 %)	41.7	***1.6	13.5	82.4	10.1	9.9	10.6	10.3	8.7	10.9	9.5	9.4	10.9	9.6	9.7	11.2	13.7	12.1	10.8	10.7	9.7	11.1	11.4	9.6	11.1	10.8	10.4	11.4	***8.3	8.3	11.2	9.7	10.1	9.7	10.9	9.1	***9.4	10.7	11.9
100 (65 %)	40.9	***1.7	12.1	81.5	10.2	10.0	11.3	10.5	***8.4	11.3	9.7	9.3	10.9	9.9	9.7	10.8	12.8	12.1	10.7	11.3	9.9	11.3	11.7	9.4	11.2	10.8	10.4	10.6	***8.1	***7.3	10.5	10.5	9.7	10.0	10.7	9.1	10.7	10.5	13.0
33 (54 %)	44.8	***1.7	16.3	78.8	9.3	9.2	10.0	9.4	***7.6	9.9	8.4	8.6	10.3	***7.8	***8.1	10.9	12.5	11.1	10.9	10.5	9.7	11.3	11.1	10.0	11.9	11.1	10.0	9.8	***7.6	***6.7	11.1	8.5	8.9	9.9	***9.5	***7.8	10.5	10.4	12.8
67 (72 %)	38.9	***1.7	10.5	82.7	10.6	10.4	11.9	10.9	8.9	11.9	10.2	9.6	11.3	10.7	10.6	10.8	13.0	12.6	10.7	11.5	9.7	11.3	11.8	9.1	10.9	10.6	10.7	11.0	***8.4	***7.8	10.2	11.3	10.1	10.0	11.2	9.9	10.8	10.6	13.1
27 (68 %)	46.3	1.3	16.1	79.1	10.0	9.4	9.6	9.3	8.6	11.1	9.9	9.3	11.1	9.3	8.7	11.8	12.1	11.8	11.0	11.4	10.1	11.3	11.5	9.6	11.6	11.3	10.7	11.4	***7.2	***6.2	10.3	8.5	8.4	10.1	10.3	8.7	***9.5	10.6	11.0
19 (70 %)	49.3	1.3	14.1	80.4	10.2	9.4	9.2	9.7	8.9	11.2	10.1	9.2	11.3	9.8	9.3	11.6	11.7	11.9	11.7	12.0	10.8	12.1	12.3	10.5	12.0	12.1	11.2	12.6	***7.3	***6.5	9.3	8.8	8.4	10.2	10.5	9.0	***9.3	10.3	10.6
24 (52 %)	41.3	***1.5	9.2	82.4	10.9	9.2	11.2	11.3	10.0	11.8	11.1	9.3	12.0	11.5	11.6	12.3	13.0	13.1	11.3	12.1	10.4	12.9	12.7	7.9	10.7	12.4	11.2	12.5	***7.9	***8.2	***7.3	11.5	9.8	12.5	12.2	11.5	10.4	10.3	11.6
67 (68 %)	39.9	1.3	10.4	82.7	***11.0	9.5	11.7	11.2	9.7	11.9	10.9	9.7	11.4	11.0	11.1	10.9	12.8	13.0	10.6	11.9	10.0	12.2	11.4	***7.7	10.9	10.9	11.2	12.1	***8.1	***8.4	***7.7	11.0	10.1	11.6	11.8	11.2	***10.1	11.8	***9.3
50 (66 %)	37.0	1.1	6.9	86.0	***11.2	10.7	12.2	11.6	9.6	12.4	11.2	10.3	11.8	12.1	12.0	12.1	12.8	12.9	10.7	11.4	10.0	12.0	11.1	9.2	11.3	10.4	10.8	11.7	***8.0	***8.4	***7.9	10.9	9.1	11.5	12.1	10.6	10.3	12.2	***9.4

“Multilevel” model predicting sick-leave 12 months later n = 3857 participants, 2014



Parsimonious model: Framingham relative risk index, **smoking status**, purpose, commitment, supportive leadership, predictability of work, skill development potential, work-privacy conflict

Predicting 2015 Sick Leave from 2014 Questionnaire Path Model on Group Averages (n = 44 work groups)

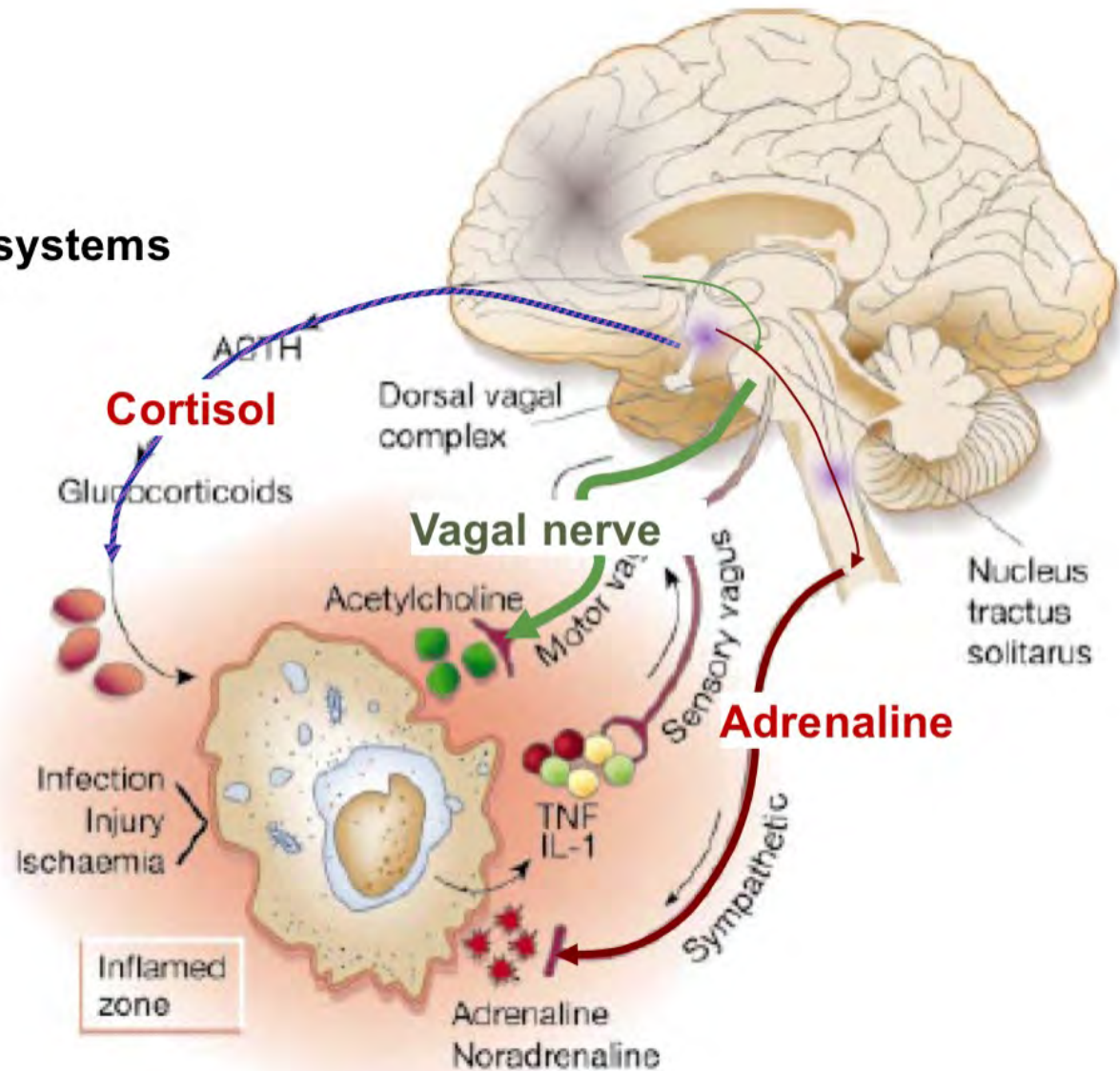




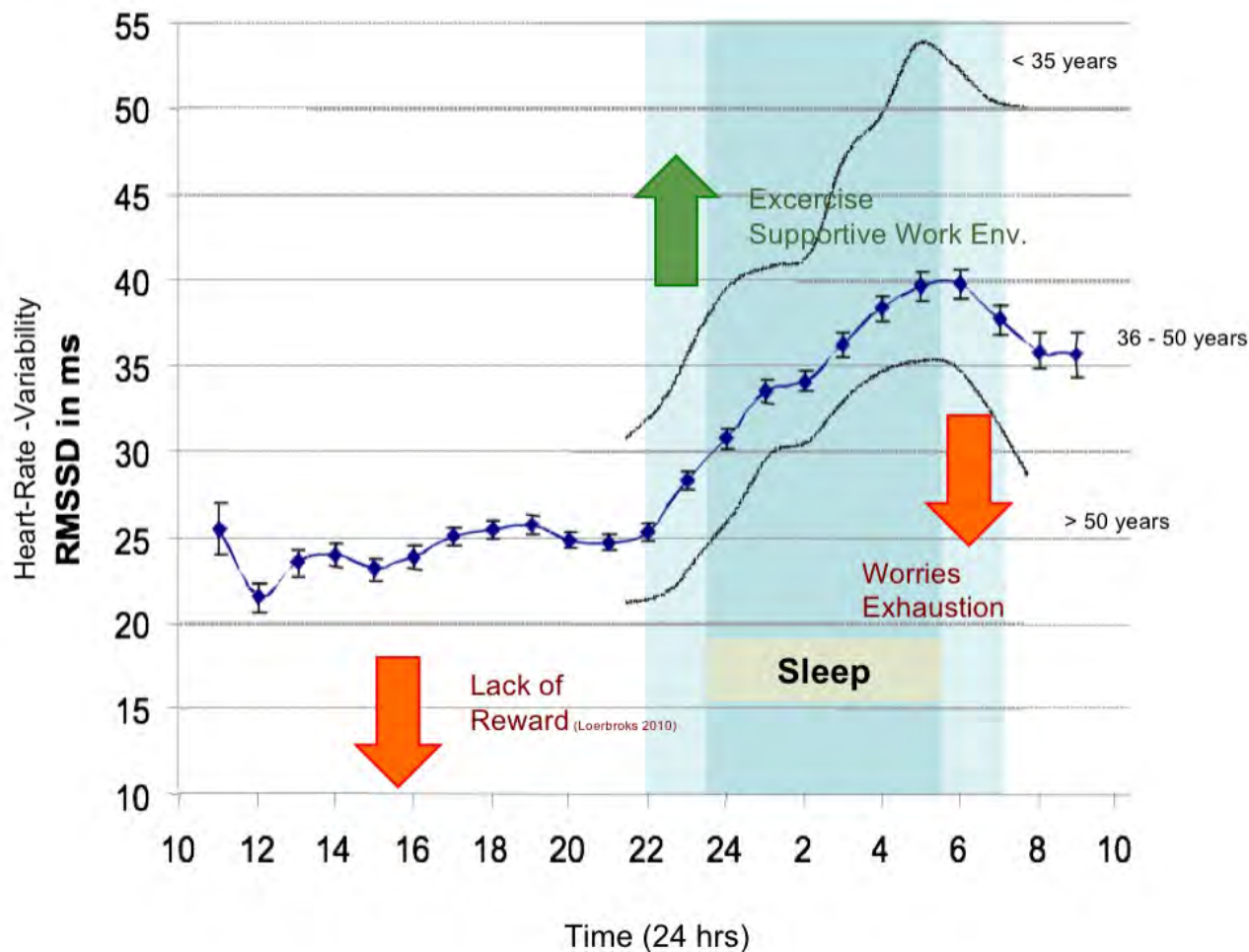
**Possible bio-psychological pathways:
The need to consider differential effects
along the life-span**

Wiring of stress-responsive systems

Vagal nerve = stress brake
Sympathetic = accelerator
Hormones = turbo-charge



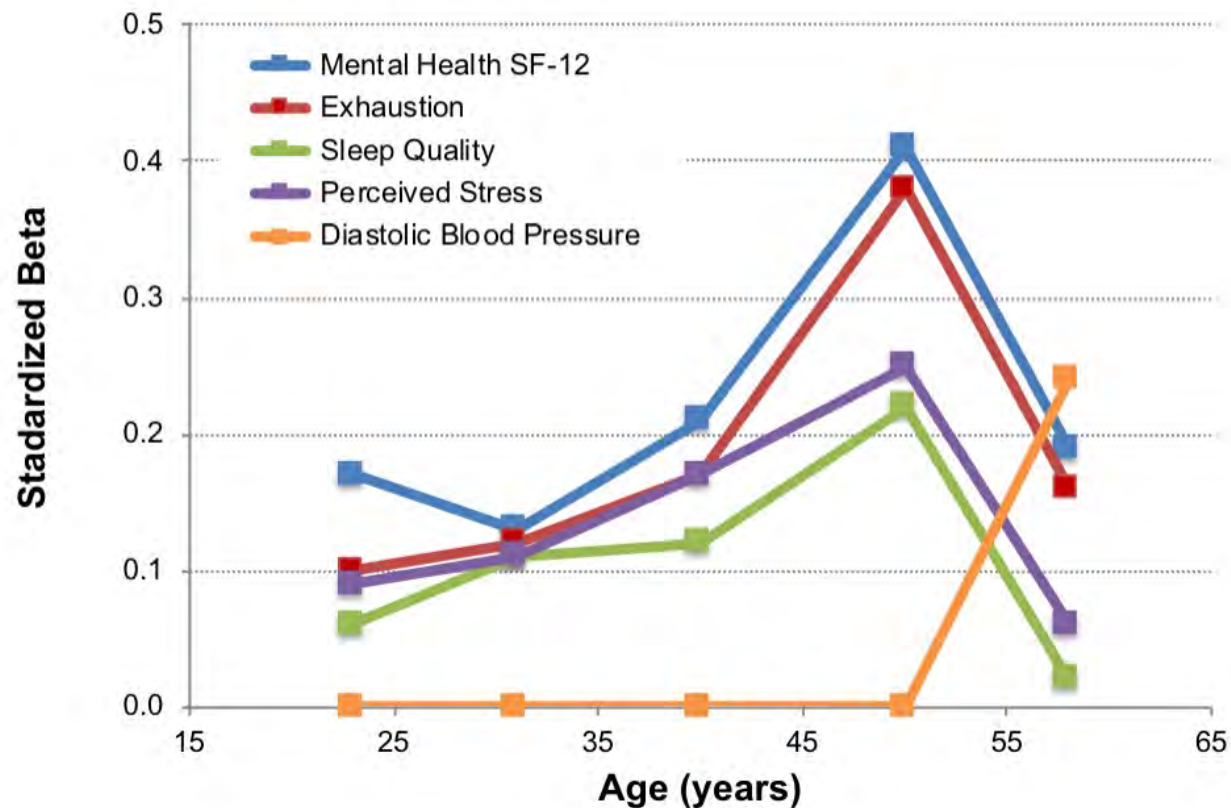
Factors affecting heart rate variability as index of parasympathetic tone



Purpose revisited



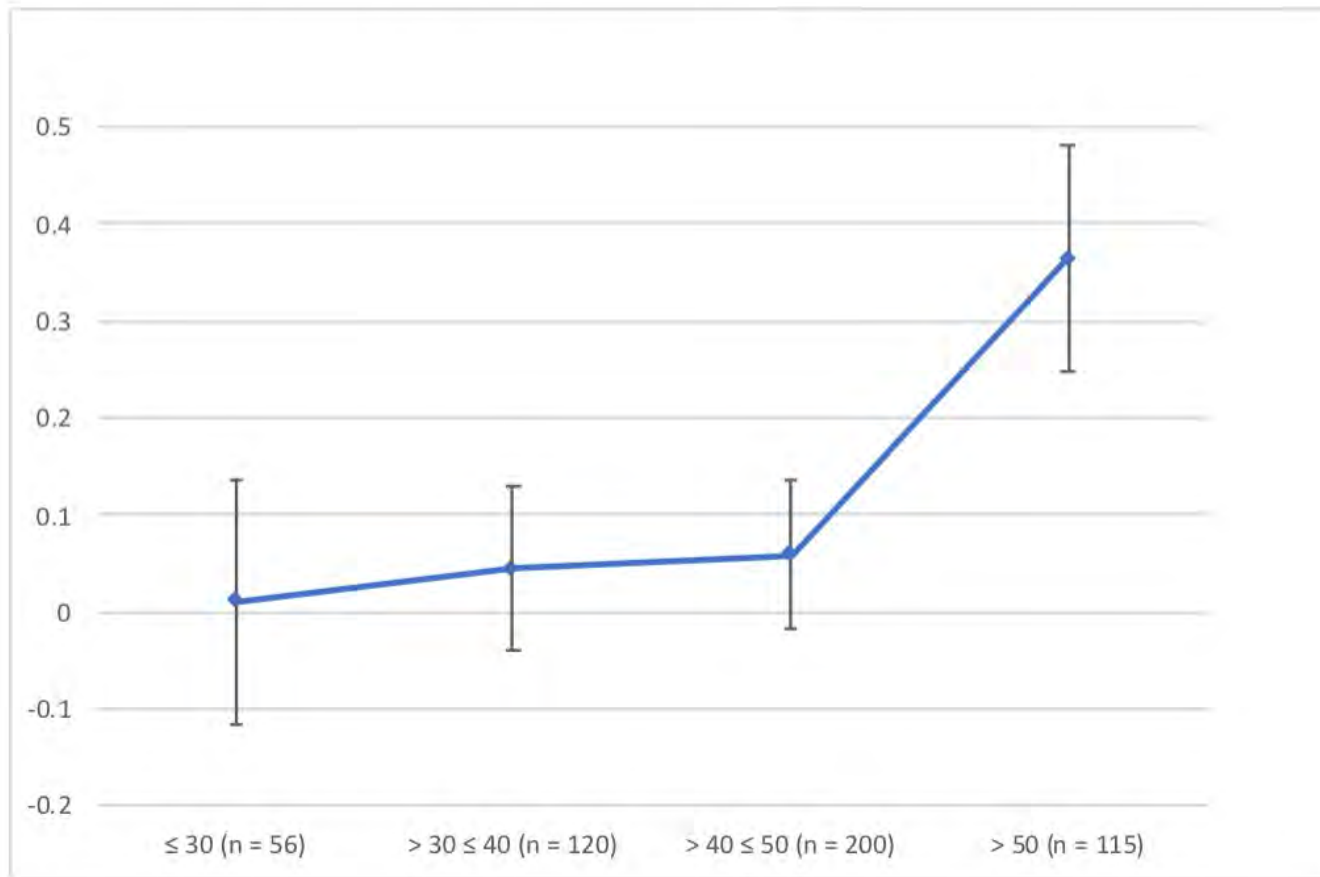
Purposeful work and health outcomes (n = 1891)



Effort-Reward-Imbalance and Carotid Intima Thickness



Cross-sectional data, controlling for worries and chronic stress perception, expressed as effect sizes, stratified for age.



The Value Proposition Canvas

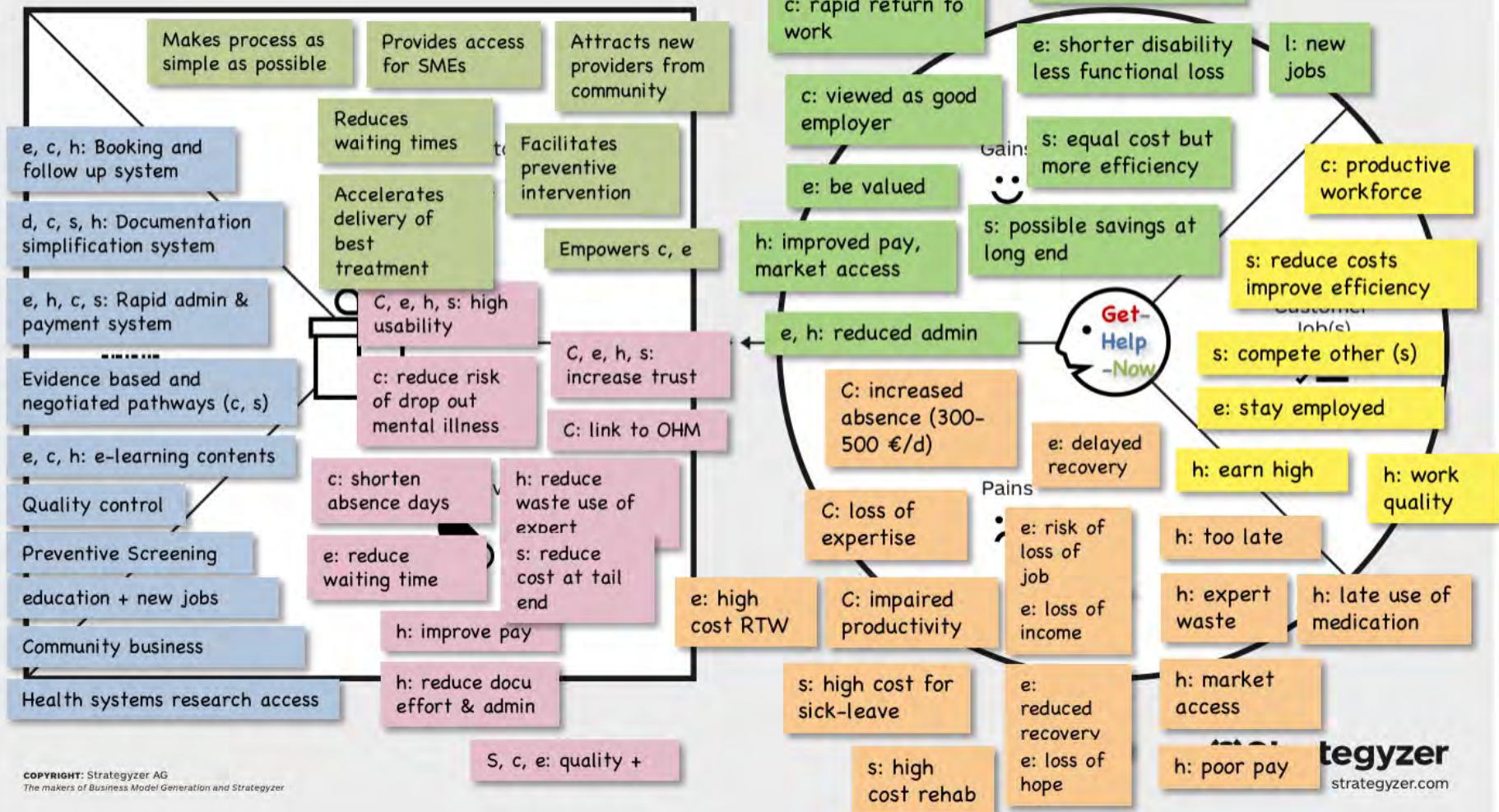
Early Intervention for MSK and Depression

Legend Customers: **C**: company **e**: employee
h: healthcare provider **s**: healthcare payer /
 pension fund / social security **l**: community



Value Proposition

Customer Segment



Take Home Messages

Improvement of psychosocial work conditions are more relevant than health behavior change promotion.

Change in organizations always entails complex, multilevel interventions

Systems thinking and multilevel designs: applying the right intervention to the right level and systems component

A huge challenge is to develop and test interventions from understanding of long-term effect of small changes in the psycho-biological regulatory systems.

New methods are needed for a posteriori impact and causal evaluation



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