Congresso SIML, Sezione territoriale lombarda
Giovedì, 15 Giugno 2023 - Aula Magna Mangiagalli Policlinico

Quali evidenze epidemiologiche per la prevenzione del rischio cardiovascolare in ambito lavorativo?

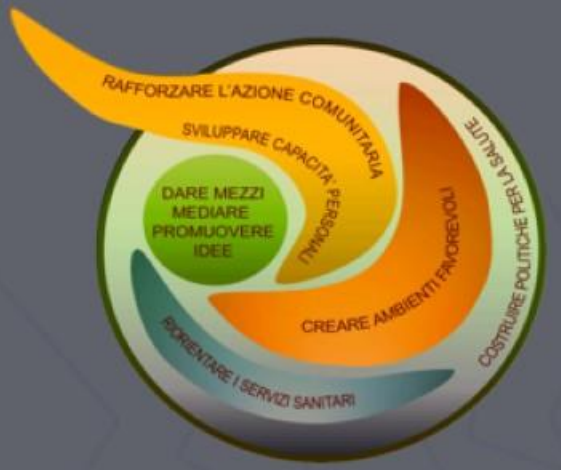
ovvero: TWH nella prevenzione del rischio CVD in ambito lavorativo

Marco M. Ferrario
Professore Senior di Medicina del Lavoro,
Università degli studi dell'Insubria, Varese
Chair ICOH SC Cardiology in Occupational Health

Health Promotion

La promozione della salute è stata definita
"il processo che consente di esercitare un maggiore controllo sulla propria salute e di migliorarla"

Carta di Ottawa, 1986



Workplace Health Promotion (WHP)

Insieme di interventi e strategie aziendali, finalizzate a ottimizzare la salute dei lavoratori e la loro capacità lavorativa, attraverso il coinvolgimento dei datori di lavoro, dei lavoratori e della società in senso ampio

International Association for Worksite HP (IAWHP) Atlanta Announcement on Worksite Health Promotion; 26 march 2009

Workplace Health Promotion (WHP)

Il risultato di sforzi congiunti di datore di lavoro, lavoratori e società, finalizzati al benessere dei lavoratori attraverso tre azioni focali:

- migliorare l'organizzazione e l'ambiente lavorativo
- promuovere la partecipazione ai programmi di promozione della salute
- incoraggiare lo sviluppo delle risorse personali dei singoli lavoratori

European Network for Workplace Health Promotion
Dichiarazione di Lussemburgo, 2018

Workplace Health Promotion (WHP)

Aspetti peculiari:

- si effettua nel luogo di lavoro;
- interessa una popolazione piuttosto stabile, che agevola interventi ripetuti nel tempo;
- tiene conto degli effetti sulla salute umana dei rischi legati a stili di vita e dei rischi professionali sinergici;
- permette di valutare l'efficacia degli interventi stessi mediante follow-up.

Il codice internazionale dell'ICOH ha inserito la promozione della salute tra i doveri del Medico del Lavoro

D.Lgs. 81/08 stabilisce l'opportunità di collaborare all'attuazione di programmi di promozione della salute, che tuttavia devono essere realizzati su base volontaria e richiedono l'attenta valutazione del rapporto costi benefici da parte dell'azienda e del Medico Competente.

WHP Risultati - *Soler 2010 , Review di oltre 50 programmi di WHP*

Task Force sui servizi di prevenzione - Guide to Community Preventive Services - CDC Atlanta

TIPOLOGIA DI INTERVENTO

Educazione Sanitaria
- alimentazione sana,
- cessazione del fumo
- riduzione consumo alcolico
- incremento attività fisica

Interventi nell'ambiente di lavoro
- divieto di fumo nell'ambiente di lavoro
- miglioramento della ristorazione

Politiche aziendali
- concessione di incentivi e sussidi per facilitare la partecipazione allo studio
- strategie motivazionali attraverso incontri per sostenere i lavoratori a raggiungere un obiettivo comportamentale

OUTCOMES

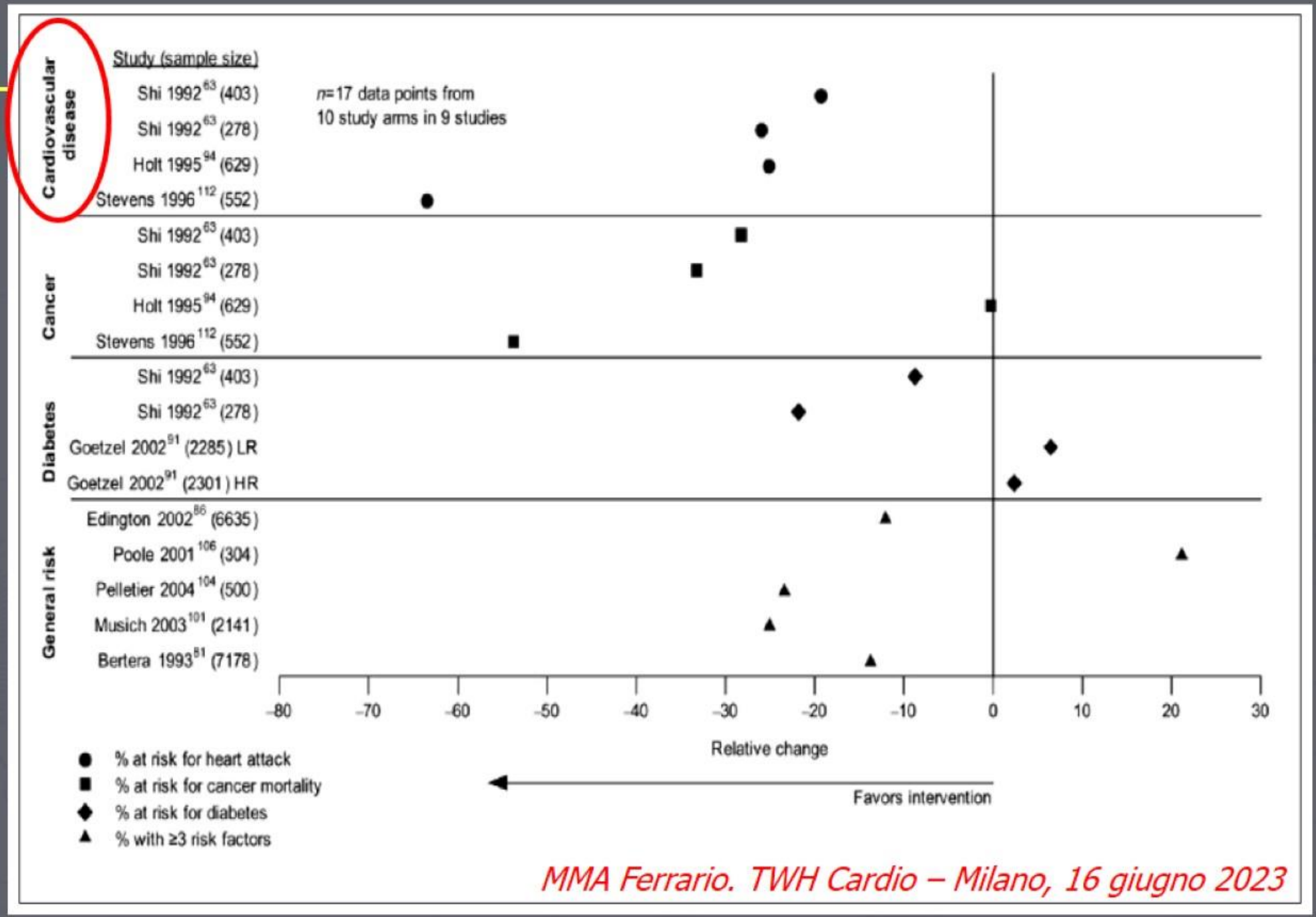
Comportamentali
- Consumo di alcol
- Fumo
- Dieta
- Attività fisica
- Utilizzo di cinture di sicurezza

Fisiologici
- Pressione Arteriosa
- BMI
- Colesterolemia

Altri
- Assenteismo
- Adesione a screening per prevenzione oncologica
- Accesso ai servizi sanitari

Soler 2010

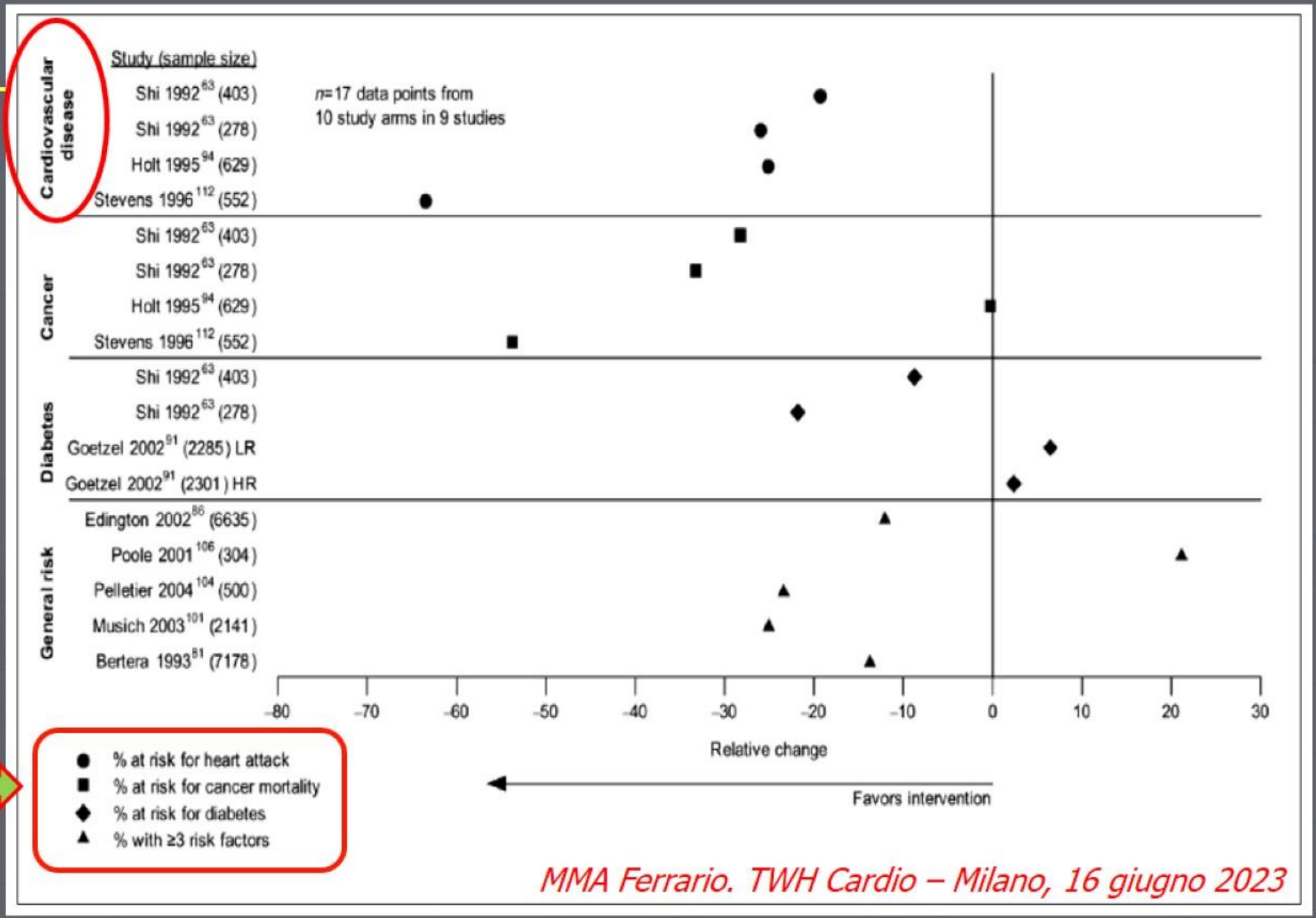
Variazioni Relative percento di quattro risultati sanitari attribuibili agli interventi AHRF Plus.



Soler 2010

Variazioni Relative percento di quattro risultati sanitari attribuibili agli interventi AHRF Plus.

Stime del rischio atteso in base a funzioni di rischio



Soler 2010 Conclusioni

I programmi ampli, con educazione sanitaria, se periodicamente ripetuta, hanno ottenuto risultati migliori, valutati con *outcomes* comportamentali e fisiologici:

- fumo, assunzione di alcolici, grassi nella dieta
- colesterolemia, PA
- assenteismo, utilizzo di cinture di sicurezza

I programmi che prevedevano un *Assessment of Health Risks with Feedback Plus (AHRFp)*, hanno dimostrato maggior adesione dei partecipanti e miglior efficacia.

Soler 2010 Conclusioni

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MM Ferrario, A Borsani. Promozione della salute negli ambienti di lavoro: quali evidenze di efficacia? G Ital Med Lav Erg 2011; 33:2, Suppl, 44-7

«Tra gli interventi suscettibili di efficacia vi sono: riduzione di fumo ed abuso di alcol, aumento dell'attività fisica ed l'utilizzo delle cinture di sicurezza.»

MMA Ferrario. TWH Cardio – Milano, 16 giugno 2023

Rongen et al. Workplace Health Promotion. A meta-analysis of effectiveness. Am. J. Prev Med. 2013 44(4): 406-415.

Studi considerati: Programmi di WHP - RCT, con informazioni quantitative per calcolare la dimensione dell'effetto.

Interventi considerati:

- Cessazione dell'abitudine al fumo,
- Aumento della attività fisica
- Alimentazione sana
- Riduzione del sovrappeso corporeo
- Miglioramento della percezione del proprio stato di salute
- Riduzione delle assenze per malattia
- Produttività
- Miglioramento della *work ability*

Rongen et al. Workplace Health Promotion. A meta-analysis of effectiveness. Am. J. Prev Med. 2013 44(4): 406-415.

La dimensione dell'effetto è risultata PICCOLA ed ha riguardato:

- Miglioramento della percezione del proprio stato di salute
- Riduzione delle assenze per malattia
- Miglioramento della *work ability*

Programmi WHP più efficaci per:

- **Figure impiegatizie**
- Popolazione di **età media inferiore ai 40 anni**
  > Dato confermato anche da altre review*

* *Poscia A et al. BMC Health Services research. 2016 16(sppl 5): 329*

Gli studi con una scarsa qualità metodologica hanno riportato un effetto di efficacia 2,9 volte maggiore! Hanno mostrato un Effect Size minore gli studi RCT e quelli che hanno considerato e gestito i confondenti.

Questo potrebbe indicare bias di pubblicazione.

WHP Limiti

Le revisioni sistematiche sugli studi di intervento hanno riportato

- effetti di **modesta entità** e
- la valutazione complessiva dell'efficacia dei WHP-P e quindi la loro applicabilità, è ostacolata da una **grande eterogeneità negli interventi** e **nelle popolazioni di studio**.
- **Basse adesioni e alto abbandono**

Jackson N et al. J Public Health (Oxf) 2004;26(3): 303–7.
Kuoppala J et al. J Occup Environ Med 2008;50(11):1216 –27.
Higgins JPT et al. The Cochrane Collaboration, Wiley Online Library; 2008.
Soler RE et al. Am J Prev Med. 2010. 38(2s):s237-262
Rongen A et al.. Am. J. Prev Med. 2013 44(4): 406-415

Un esempio italiano in Sanità di WHP

Pagine: 240 pagine, Tabelle 19, Figure 65, Riquadri 60.

Laboratorio FIASO

Sviluppo e tutela del benessere e della salute organizzativa nelle Aziende Sanitarie

AMBITO AZIENDALE

A livello territoriale ogni Azienda partecipante ha coinvolto i seguenti attori:

- Garante Aziendale del processo: Direttore Generale;
- Gruppo di Lavoro aziendale: composto prevalentemente da professionisti appartenenti alle Strutture variamente denominate di: Psicologia, Amministrazione del Personale e/o Organizzazione Sviluppo Risorse Umane, Servizio di Prevenzione e Protezione, Medicina del Lavoro e Medico Competente;
- Referente tecnico aziendale: partecipa al Gruppo tecnico di Lavoro nazionale, con cui raccorda gli interventi, gli strumenti e i metodi, favorisce il monitoraggio dei processi.

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Cassazione Civile, Sez. Lav., 28 febbraio 2023, n. 6008 - Infarto da superlavoro e richiesta di risarcimento del danno biologico. Onere della prova

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Dirigente medico di primo livello in ortopedia e traumatologia, dipendente della ASL L-V-C, convenne in giudizio l'azienda datrice di lavoro per chiederne la condanna al risarcimento del danno biologico conseguente all'infarto del miocardio subito a causa del sotto dimensionamento dell'organico che l'aveva costretto per molti anni a intollerabili ritmi e turni di lavoro

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«... corretta premessa che la responsabilità ai sensi dell'art. 2087 c.c. ha natura contrattuale e che, di conseguenza, «incombe sul lavoratore che lamenti di avere subito, a causa dell'attività lavorativa, un danno alla salute, l'onere di provare l'esistenza di tale danno, come pure la nocività dell'ambiente di lavoro, nonché il nesso tra l'uno e l'altro elemento, mentre grava sul datore di lavoro – una volta che il lavoratore abbia provato le predette circostanze – l'onere di provare di aver fatto tutto il possibile per evitare il danno, ovvero di aver adottato tutte le cautele necessarie per impedire il verificarsi del danno medesimo»

MMA Ferrario. TWH Cardio – Milano, 16 giugno 2023

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La corte d'appello ha dunque errato nel pretendere dall'attore (e appellante) l'indicazione di «ben determinate norme di sicurezza», essendo idonea e sufficiente a dimostrare la nocività dell'ambiente di lavoro l'allegazione (e la prova) dello svolgimento prolungato di prestazioni eccedenti un normale e tollerabile orario lavorativo.

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Il fatto che sia stata riconosciuta in sede amministrativa la causa di servizio ai fini dell'equo indennizzo e che sia stata prodotta in giudizio la relativa documentazione, se non vale come prova legale (vincolante per il giudice) del nesso causale, ben potrebbe essere prudentemente apprezzata, ai sensi dell'art. 116 c.p.c., come prova sufficiente di quel nesso, in mancanza di elementi istruttori di segno contrario (Cass. n. 23187 /2022).

Integrazione tra Health Promotion (HP) e Occuptional Safety and Health (OSH)

Tradizionalmente, gli interventi di HP e di OSH sono stati realizzati parallelamente e indipendentemente nei luoghi di lavoro.

L'interesse per l'integrazione degli interventi di OSH e HP è cresciuto in modo sostanziale. Una delle ragioni principali di tale interesse è l'evidenza che fattori di rischio lavorativi contribuiscono a patologie tradizionalmente considerate non correlate al lavoro (come le malattie cardiovascolari e la depressione).

Dal 2003 il *National Institute for Ocupational Safety and Health* (NIOSH) ha sostenuto l'integrazione di interventi di OSH e di HP:

nel 2008 *WorkLife Iniziative*,

nel 2011 *Total Worker Health*

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Il NIOSH, sulla base dei risultati in letteratura, ha individuato quattro ragioni per integrare i due approcci OSH - HP:

1. Il rischio di malattia dei lavoratori è aumentato a causa di esposizione a fattori di rischio occupazionali e comportamentali, anche intra-lavorativi
2. I lavoratori esposti a più elevati rischi occupazionali sono quelli più esposti a comportamenti a rischio per la salute
3. L'integrazione della WHP e dei programmi di OSH può aumentare la partecipazione e l'efficacia dei programma per i lavoratori ad alto rischio.
4. Gli sforzi integrati di HP e OSH possono portare benefici all'organizzazione del lavoro

Research Compendium – NIOSH – TWH 2012

2011 – Total Worker Health

Nel giugno 2011 il NIOSH ha definito e registrato una nuova definizione: **Total Worker Health**

che si riferisce ad una "*strategia che, attraverso **politiche**, **programmi** e **pratiche** integra la sicurezza negli ambienti di lavoro con la promozione della salute, per prevenire infortuni e malattie, professionali e non, e promuovere salute e benessere negli ambienti di lavoro*".

Research Compendium – NIOSH – TWH 2012

NIOSH, USA

Total Worker Health® is defined as policies, programs, and practices that integrate protection from work-related safety and health hazards, with promotion of injury and illness prevention efforts to advance worker well-being.

Issues Relevant to Advancing Worker Well-being Through Total Worker Health®

Control of Hazards and Exposures
- Chemicals
- Physical Agents
- Biological Agents
- Psychosocial Factors
- Human Factors
- Risk Assessment and Risk Management

Organization of Work
- Fatigue and Stress Prevention
- Work Intensification Prevention
- Safe Staffing
- Overtime Management
- Healthier Shift Work
- Reduction of Risks from Long Work Hours
- Flexible Work Arrangements
- Adequate Meal and Rest Breaks

Built Environment Supports
- Healthy Air Quality
- Access to Healthy, Affordable Food Options
- Safe and Clean Restroom Facilities
- Safe, Clean and Equipped Eating Facilities
- Safe Access to the Workplace
- Environments Designed to Accommodate Worker Diversity

Leadership
- Shared Commitment to Safety, Health, and Well-Being
- Supportive Managers, Supervisors, and Executives
- Responsible Business Decision-Making
- Meaningful Work and Engagement
- Worker Recognition and Respect

Compensation and Benefits
- Adequate Wages and Prevention of Wage Theft
- Equitable Performance Appraisals and Promotion
- Work-Life Programs
- Paid Time Off (Sick, Vacation, Caregiving)
- Disability Insurance (Short- & Long-Term)
- Workers' Compensation Benefits
- Affordable, Comprehensive Healthcare and Life Insurance
- Prevention of Cost Shifting between Payers (Workers' Compensation, Health Insurance)
- Retirement Planning and Benefits
- Chronic Disease Prevention and Disease Management
- Access to Confidential, Quality Healthcare Services
- Career and Skills Development

Community Supports
- Healthy Community Design
- Safe, Healthy and Affordable Housing Options
- Safe and Clean Environment (Air and Water Quality, Noise Levels, Tobacco-Free Policies)
- Access to Safe Green Spaces and Non-Motorized Pathways
- Access to Affordable, Quality Healthcare and Well-Being Resources

Changing Workforce Demographics
- Multigenerational and Diverse Workforce
- Aging Workforce and Older Workers
- Vulnerable Worker Populations
- Workers with Disabilities
- Occupational Health Disparities
- Increasing Number of Small Employers
- Global and Multinational Workforce

Policy Issues
- Health Information Privacy
- Reasonable Accommodations
- Return-to-Work
- Equal Employment Opportunity
- Family and Medical Leave
- Elimination of Bullying, Violence, Harassment, and Discrimination
- Prevention of Stressful Job Monitoring Practices
- Worker-Centered Organizational Policies
- Promoting Productive Aging

New Employment Patterns
- Contracting and Subcontracting
- Precarious and Contingent Employment
- Multi-Employer Worksites
- Organizational Restructuring, Downsizing and Mergers
- Financial and Job Security

November 2015

Total Worker Health® is a registered trademark of the US Department of Health and Human Services

NIOSH, USA

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November 2015

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Fundamentals of *Total Worker Health®* Approaches

Essential Elements for Advancing Worker Safety, Health, and Well-Being

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

CDC NIOSH

Issues Relevant to a TOTAL WORKER HEALTH™ Perspective*

WORKPLACE
Protecting Worker Safety & Health

Control of Hazards & Exposures:
- Chemicals
- Physical Agents
- Biological Agents
- Psychosocial Factors
- Organization of Work

Prevention of Injuries, Illness & Fatalities

Promoting Safe & Healthy Work:
- Management Commitment
- Safety Culture/Climate
- Culture of Health
- Hazard Recognition Training
- Worker Empowerment

Risk Assessment & Control:
- Making the Safety & Health Case
- Assessing All Risks
- Controlling All Risks
- Root Cause Analysis
- Leading/Lagging Indicators

EMPLOYMENT
Preserving Human Resources

New Employment Patterns:
- Precarious Employment
- Part-time Employment
- Dual Employers
- Changing Demographics
  - Increasing Diversity
  - Aging Workforce
  - Multigenerational Workforce
- Global Workforce

Health & Productivity:
- Leadership Commitment to Health-Supportive Culture
- Fitness-for-Duty
- Reducing Presenteeism
- Reducing Absenteeism
- Workplace Wellness Programs

Healthcare & Benefits:
- Increasing Costs
- Cost Shifting to Workers
- Paid Sick Leave
- Electronic Health Record
- Affordable Care Act
- HIPAA† Health Information Privacy

WORKERS
Promoting Worker Health & Well-Being

Optimal Well-Being:
- Employee Engagement
- Health & Well-Being Assessments
- Healthier Behaviors
  - Nutrition
  - Tobacco Use Cessation
  - Physical Activity
  - Work/Life Balance
- Aging Productively
- Preparing for Healthier Retirement
- Policy & Built Environment Supports

Workers with Higher Health Risks:
- Young Workers
- Low-Income Workers
- Migrant Workers
- Workers New to a Hazardous Job
- Differently-Abled Workers
- Veterans

Compensation & Disability:
- Disability Evaluation
- Reasonable Accommodations
- Return-to-Work
- Social Security Disability Insurance

*Issues in these lists are for illustrative purposes, are not meant to be exhaustive nor do they necessarily reflect equivalent importance.
†Health Insurance Portability and Accountability Act

REVIEW PROGETTI INTEGRATI – *NIOSH 2016*

In letteratura i lavori che integrano interventi di HP e OSH sono numericamente molto esigui.

Il NIOSH ha pubblicato una review che esamina 24 programmi integrati OSH – HP, descritti in 33 pubblicazioni scientifiche.

Disegno di studio	N°
Singolo Gruppo (Pre/Post)	9
NR-CT	2
RCT	12
Coorte	1

Country	N°
US	16
Paesi scandinavi	4
Paesi Bassi	2
Italia	1
Australia	1

Occupational Groups	N°
Health Care Workers	6
Adminstrative Workers	3
Blues Collars	6
Construction Workers	4
Various Workers	5

AHRQ Pubblication, May 2016

REVIEW PROGETTI INTEGRATI - *NIOSH 2016*

Efficacia degli interventi analizzati

Sufficiente evidenza di efficacia per:

- Cessazione dall'abitudine al fumo
- Aumento consumo frutta e verdura
- Riduzione attività sedentaria

Insufficiente evidenza di efficacia per:

- Miglioramento della QoL
- Stress percepito
- Riduzione della Pressione Arteriosa
- Riduzione del BMI
- Incidenza di infortuni e malattie professionali

AHRQ Pubblication, May 2016

REVIEW PROGETTI INTEGRATI - *NIOSH 2016*

Limiti dei programmi analizzati

Alto rischio di Bias di Selezione e di Attrito

- 10 programmi ad alto rischio
- 5 Programmi a rischio medio

Difficilmente confrontabili per eterogeneità rispetto a:

- Progettazione e tipo di intervento
- Popolazioni lavorative coinvolte (dati anagrafici e lavorativi)
- Outcomes e risultati finali

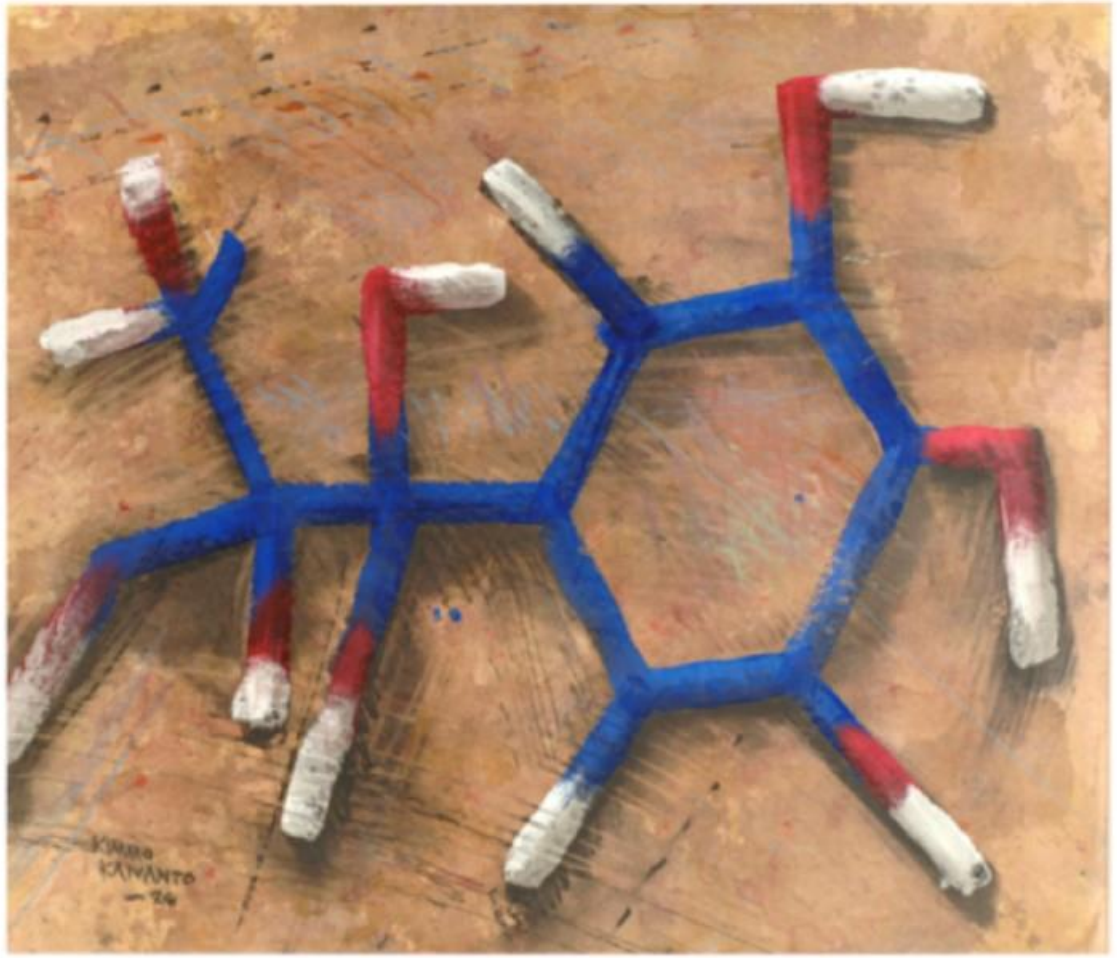
Pochi studi hanno considerato e descritto lo stato di salute di base dei lavoratori coinvolti

AHRQ Publication, May 2016

Focus on **INTERACTIONS**

INTERACTIONS WITH ENVIRONMENTS AS TOOLS FOR WELL-BEING

The 15th International Conference on Combined Actions and Combined Effects of Environmental Factors



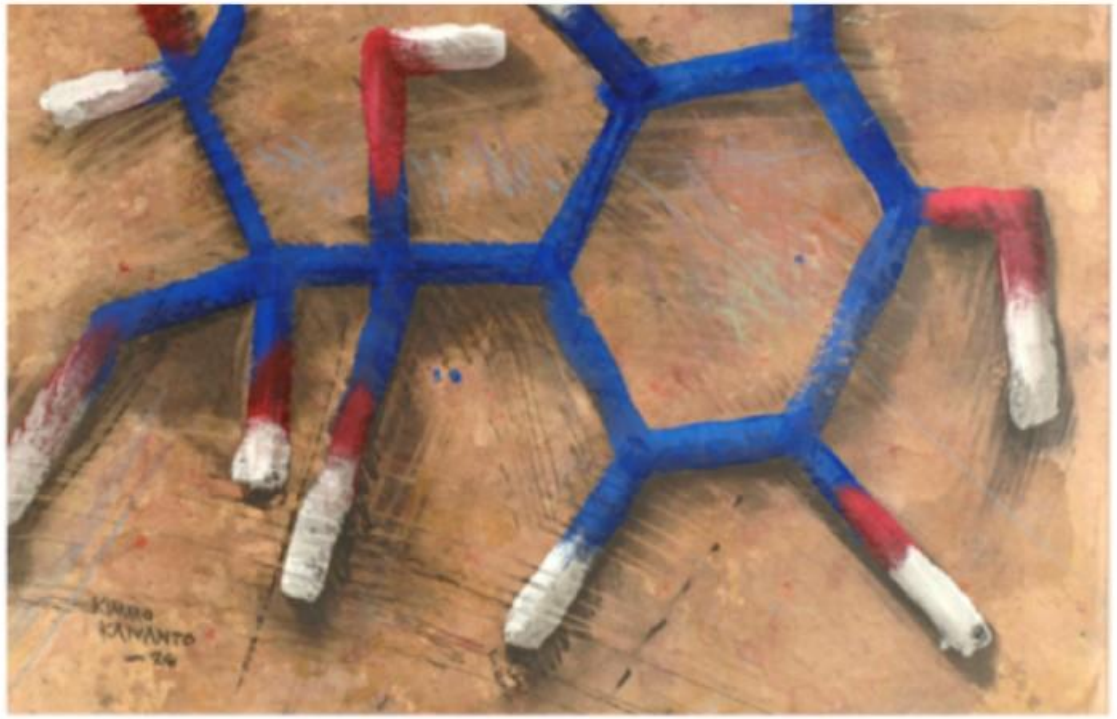
18–20 September 2016
Tampere, Finland

Focus on INTERACTIONS

INTERACTIONS WITH ENVIRONMENTS AS TOOLS FOR WELL-BEING

The 15th International Conference on Combined Actions and Combined Effects of Environmental Factors

In research into a multivariate environmental whole, interactions between factors, combinations, and mixtures of various environmental factors are very typical. To understand this complex functional whole and to depict it as it is there is an obvious need to reinvent the way of thinking, collecting research data and realizing well-being evaluations.



18–20 September 2016
Tampere, Finland

Focus on INTERACTIONS

INTERACTIONS WITH ENVIRONMENTS AS TOOLS FOR WELL-BEING

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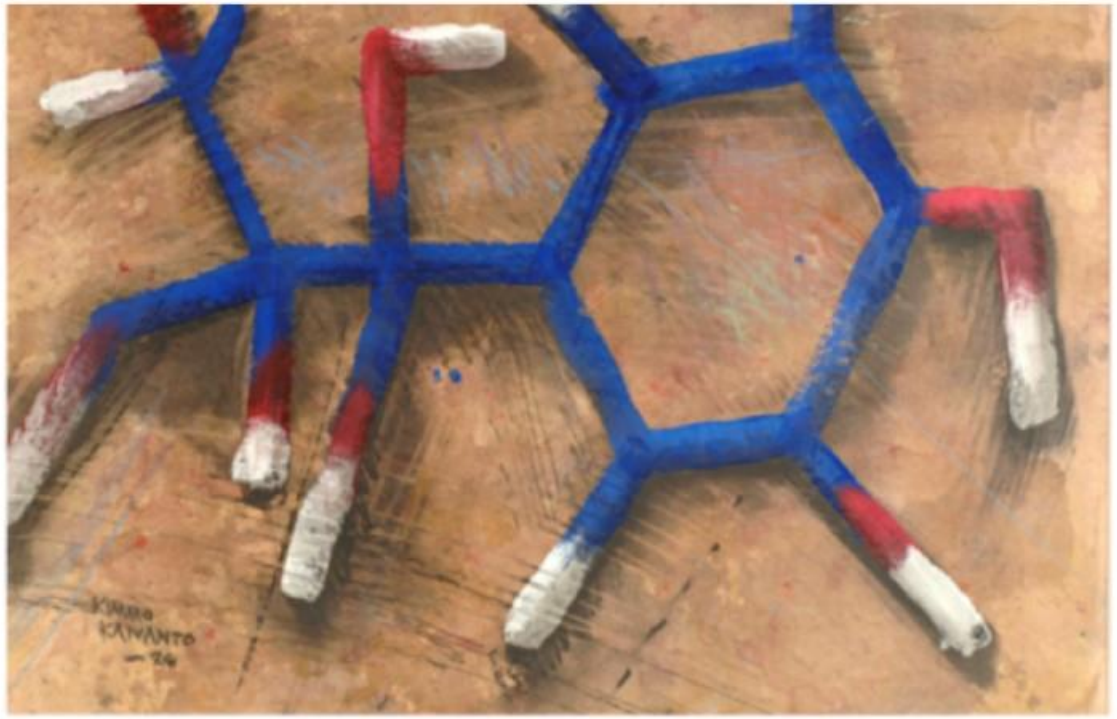

18–20 September 2016
Tampere, Finland

Evidenze scientifiche degli effetti sulla salute della interazione tra profilo di rischio lavorativo e profilo di rischio individuale è la strada della PRECISION Prevention, ...

... con un ruolo determinante del Medico del Lavoro ...

Esplorare le interazioni tra FdR CVD lavorativi e non

- Il job-strain è un FrR CVD, e per chi?
- Attività fisica sportiva e del tempo libero riduce il rischio CVD in tutti i lavoratori indistintamente dal livello di attività fisica lavorativa?
- Quali relazioni tra attività fisica lavorativa, sportiva e job strain?
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- Accuratezza prognostica di interventi sui FdR lavorativi e Life-style. Una prospettiva per il Medico del Lavoro

Open Access Research

BMJ Open

Job strain and the incidence of coronary heart diseases: does the association differ among occupational classes? A contribution from a pooled analysis of Northern Italian cohorts

Marco M Ferrario,[1,2] Giovanni Veronesi,[1] Lorenza Bertù,[1] Guido Grassi,[3,4] Giancarlo Cesana[3]

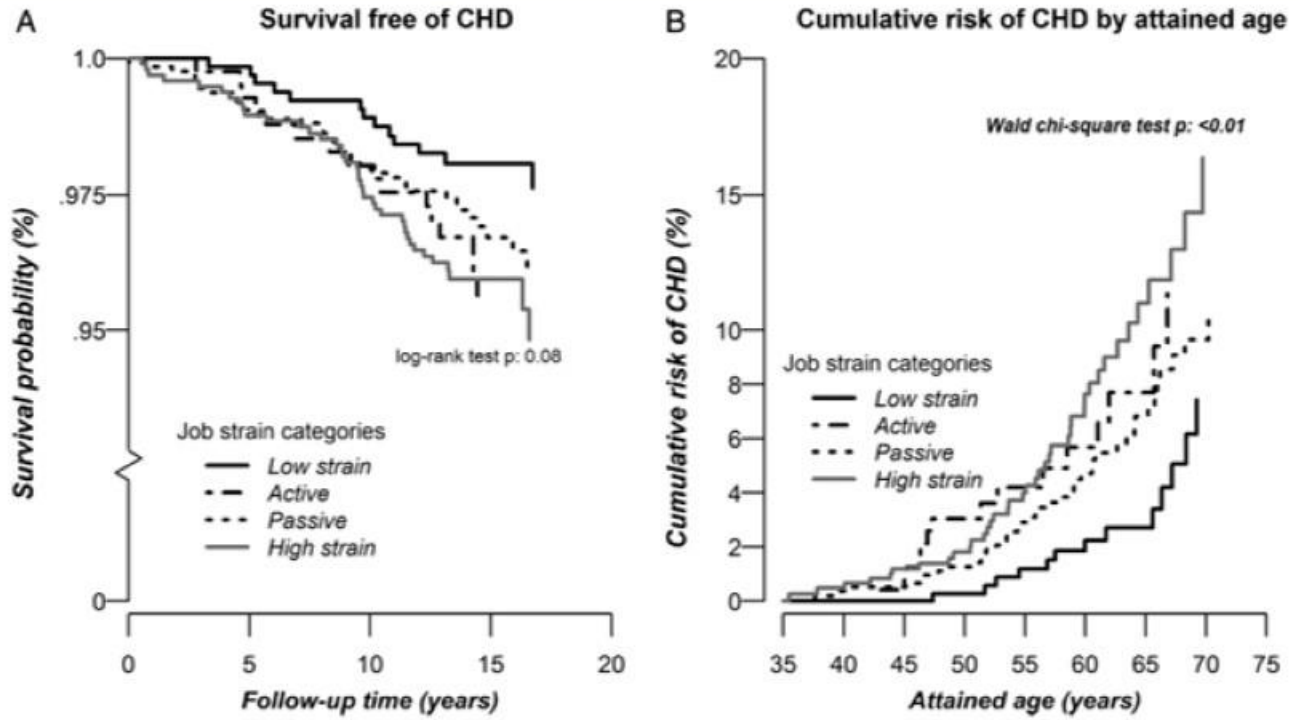

Figure 1 Survival curves (panel A, left) and cumulative risk of coronary heart disease by attained age (panel B, right) in the four JCQ quadrant-term categories, among the occupational class of non-manual and manual workers. Men were 25–64 years old and employed at time of recruitment. JCQ, Job Content Questionnaire; CHD, coronary heart disease.

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Table 2 Multivariate-adjusted HRs and 95% CIs of first CHD event, for HS versus no HS, as reference category

	Entire sample				Occupational class								
					Managers and proprietors				Manual and non-manual workers				
	N	#CHD	HR	95% CI	N	#CHD	HR	95% CI	N	#CHD	HR	95% CI	p Value*
Job strain categories													
All events in the entire follow-up period included													
No HS	3038	126	REF		713	57	REF		2325	69	REF		0.04
HS	1065	46	1.39	0.99 to 1.97	106	7	0.71	0.32 to 1.56	959	39	1.78	1.20 to 2.66	

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La relazione tra JS e CHD è evidente nei lavoratori salariati (manual e non manual) ma non in altri gruppi lavorativi

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OEM Online First, published on December 30, 2010 as 10.1136/oem.2010.060822

Original article

The contribution of major risk factors and job strain to occupational class differences in coronary heart disease incidence: the MONICA Brianza and PAMELA population-based cohorts

Marco M Ferrario,[1] Giovanni Veronesi,[1] Lloyd E Chambless,[2] Roberto Sega,[3] Carla Fornari,[3] Matteo Bonzini,[1] Giancarlo Cesana[3]

Table 3 HRs of first CHD event, by occupational class

EGP class	No of events	Age-adjusted HR (95% CI)	MRF adjusted*		MRF and JS adjusted†	
			HR (95% CI)	Decrease in HR§ (%)	HR (95% CI)	Decrease in HR§ (%)
Administrators and professionals	13	1.56 (0.6 to 4.0)	1.55 (0.6 to 4.0)	1.5	1.58 (0.6 to 4.1)	−2.7
Non-manual workers	7	Ref	Ref	—	Ref	—
Manual workers	13	1.49 (0.6 to 3.8)	1.18 (0.5 to 3.0)	57.8	1.12 (0.4 to 2.9)	71.4
Self-employed	15	2.28 (0.9 to 5.7)	2.38 (1.0 to 6.0)	−5.3	2.45 (1.0 to 6.2)	−8.9
p Value‡	—	0.35	0.20		0.15	

JS con altri FR CVD spiegano la maggior parte (71%) dell'eccesso di rischio CVD nei manual workers, ma non nei self-employed e dirigenti

Esplorare le interazioni tra FdR CVD lavorativi e non

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ORIGINAL RESEARCH ARTICLE

Differing associations for sport versus occupational physical activity and cardiovascular risk

Marco Mario Ferrario,[1,2,3] Mattia Roncaioli,[3] Giovanni Veronesi,[1] Andreas Holtermann,[4,5] Els Clays,[6] Rossana Borchini,[2] Marco Cavicchiolo,[1] Guido Grassi,[7,8] Giancarlo Cesana,[7] on behalf of The Cohorts Collaborative Study in Northern Italy (CCSNI) Research Group

To cite: Ferrario MM, Roncaioli M, Veronesi G, *et al*. *Heart* 2018;**104**:1165–1172.

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Editorial

Preventing disease by integrating physical activity in clinical practice: what works for whom?

Pieter Coenen

Heartbeat

Heartbeat: Is all physical activity beneficial for cardiovascular health?

doi:10.1136/heartjnl-2018-313725

Catherine M Otto

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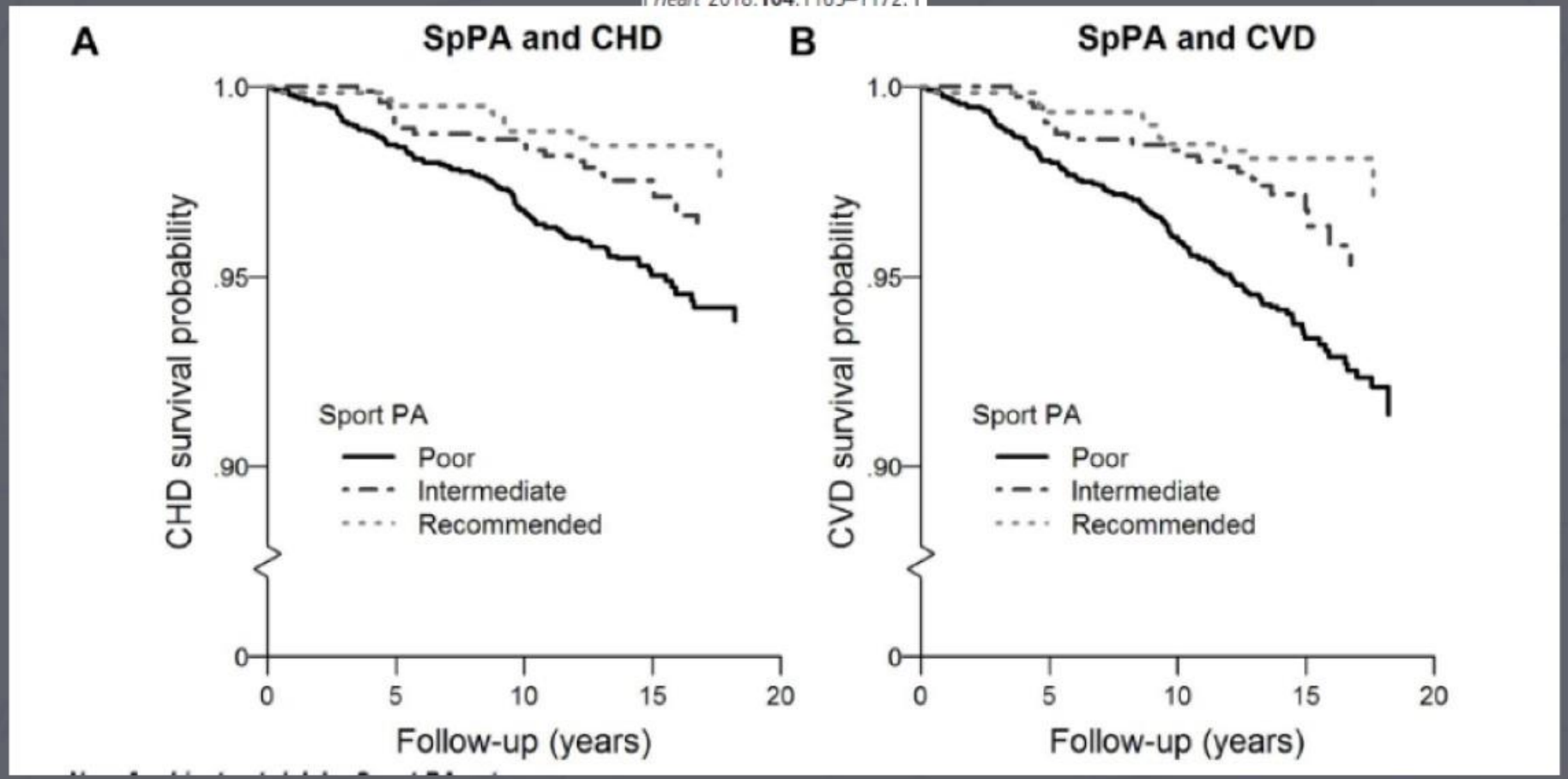
Attività fisica sportiva, secondo i livelli raccomandati da ECS, è protettiva per le malattie CVD.



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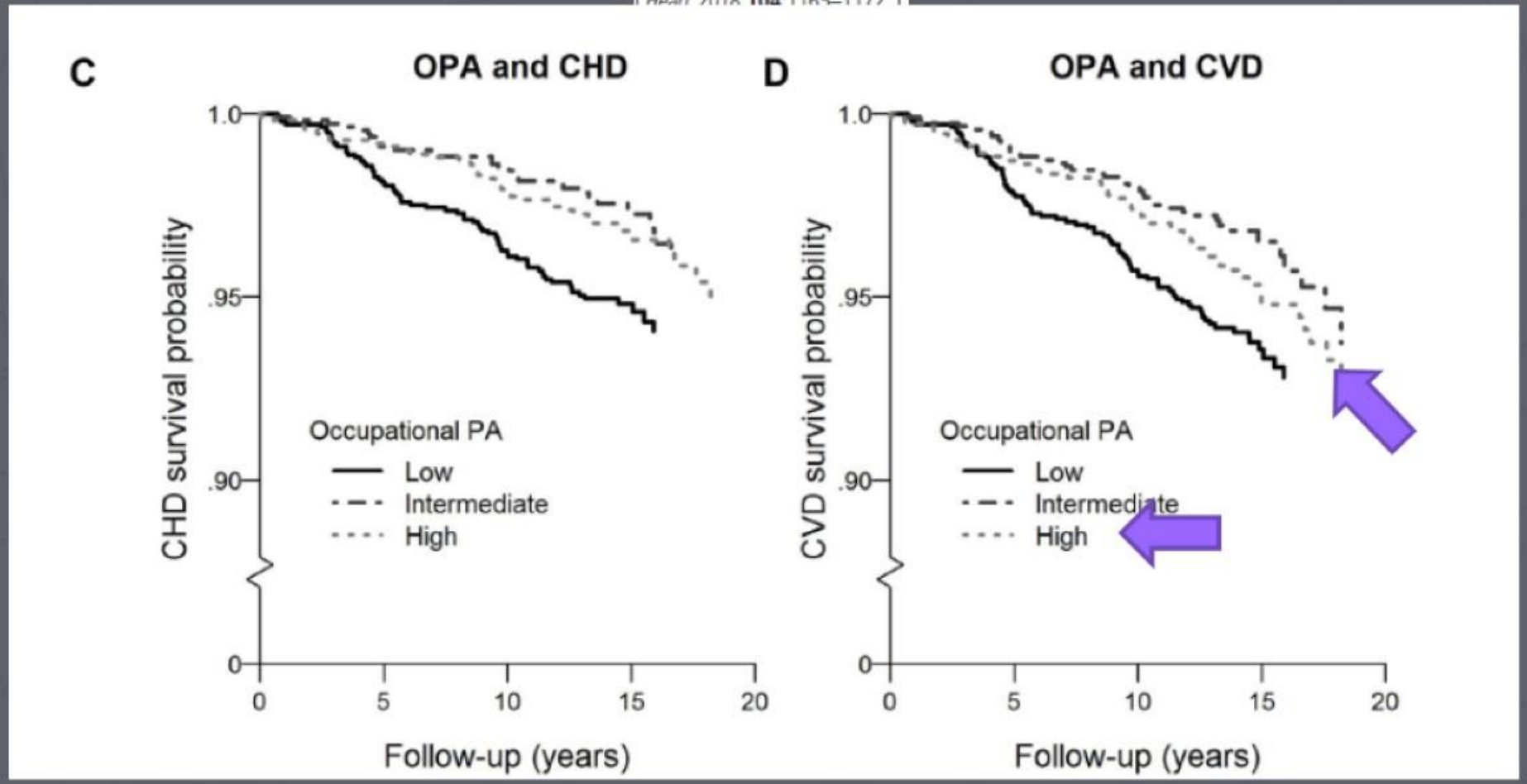
Bassi ma anche elevati livelli di attività fisica lavorativa incrementano il rischio CVD.



INTERAZIONE tra attività fisica lavorativa e sportiva.

ORIGINAL RESEARCH ARTICLE

Differing associations for sport versus occupational physical activity and cardiovascular risk

Marco Mario Ferrario,[1,2,3] Mattia Roncaioli,[3] Giovanni Veronesi,[1]
Andrea
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Norther

Table 1 Risk factors-adjusted HRs (with 95% CIs) for SpPA in different OPA categories, and test for SpPA–OPA interaction on the incidence of CHD and CVD events

			CHD events (n=135)		CVD events (n=174)	
OPA	SpPA	N	Rate	HR (95% CI)	Rate	HR (95% CI)
Low	Poor	799	4.09	Ref	4.79	Ref
Low	Intermediate/ recommended	544	1.56	0.45 (0.24 to 0.87)	1.86	0.45 (0.25 to 0.82)
Intermediate	Poor	673	2.01	Ref	2.98	Ref
Intermediate	Intermediate/ recommended	454	2.29	1.20 (0.54 to 2.67)	2.41	0.93 (0.43 to 1.98)
High	Poor	759	2.40	Ref	3.57	Ref
High	Intermediate/ recommended	345	3.56	1.84 (0.88 to 3.87)	4.98	1.66 (0.87 to 3.14)
*Heterogeneity test p value**		–	–	0.02	–	0.01
Interaction test p value†		–	0.02	–	0.01	

Men, aged 25–64 years, free of CVD and currently employed at baseline (n=3574). Rates (x1000 person years) are age-adjusted and estimated at the sample mean age.
Adjusted for age, cohort type (population-based vs factory-based), educational level, body mass index, total cholesterol, HDL cholesterol, systolic blood pressure, current smoking, diabetes and alcohol intake.
*Wald χ^2 test (5 df).
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CHD, coronary heart disease; CVD, cardiovascular disease; HDL, high-density lipoprotein; OPA, occupational physical activity; Ref, reference; SpPA, sport physical activity.

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INTERAZIONE tra attività fisica lavorativa e sportiva.

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In lavoratori sedentari l'effetto protettivo della attività libera nel tempo libero è evidente!

INTERAZIONE tra attività fisica lavorativa e sportiva.

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Per i lavoratori con elevati livelli di attività fisica lavorativa, intensa AFTL addirittura incrementa il rischio.

2016 European Guidelines on cardiovascular disease prevention in clinical practice

Recommendations for physical activity

Recommendations	Class[a]	Level[b]	Ref[c]
It is recommended for healthy adults of all ages to perform at least 150 minutes a week of moderate intensity or 75 minutes a week of vigorous intensity aerobic PA or an equivalent combination thereof.	I	A	258–261
For additional benefits in healthy adults, a gradual increase in aerobic PA to 300 minutes a week of moderate intensity, or 150 minutes a week of vigorous intensity aerobic PA, or an equivalent combination thereof is recommended.	I	A	259, 260
Regular assessment and counselling on PA is recommended to promote the engagement and, if necessary, to support an increase in PA volume over time.[d]	I	B	262–264
PA is recommended in low-risk individuals without further assessment.	I	C	265, 266
Multiple sessions of PA should be considered, each lasting ≥10 minutes and evenly spread throughout the week, i.e. on 4–5 days a week and preferably every day of the week.	IIa	B	267, 268
Clinical evaluation, including exercise testing, should be considered for sedentary people with CV risk factors who intend to engage in vigorous PAs or sports.	IIa	C	265

CV = cardiovascular; PA = physical activity.
[a]Class of recommendation.
[b]Level of evidence.
[c]Reference(s) supporting recommendations.
[d]Volume is the total weekly dose of PA.

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How might this impact on clinical practice?

The increasing number of sedentary workers in postindustrialised societies asks for specific interventions to promote SpPA even at the workplace. If our results were confirmed in larger studies, the CVD prevention recommendation of SpPA ought to consider the level of OPA.

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Exploring the interplay between job strain and different domains of physical activity on the incidence of coronary heart disease in adult men

Marco M Ferrario[1,2], Giovanni Veronesi[1], Mattia Roncaioli[3], Andreas Holtermann[4,5], Niklas Krause[6], Els Clays[7], Rossana Borchini[1,2], Guido Grassi[8] and Giancarlo Cesana[9]; on behalf of The Cohorts Collaborative Study in Northern Italy (CCSNI) Research Group

European Journal of Preventive Cardiology
2019, Vol. 26(17) 1877–1885

DOI: 10.1177/2047487319852186
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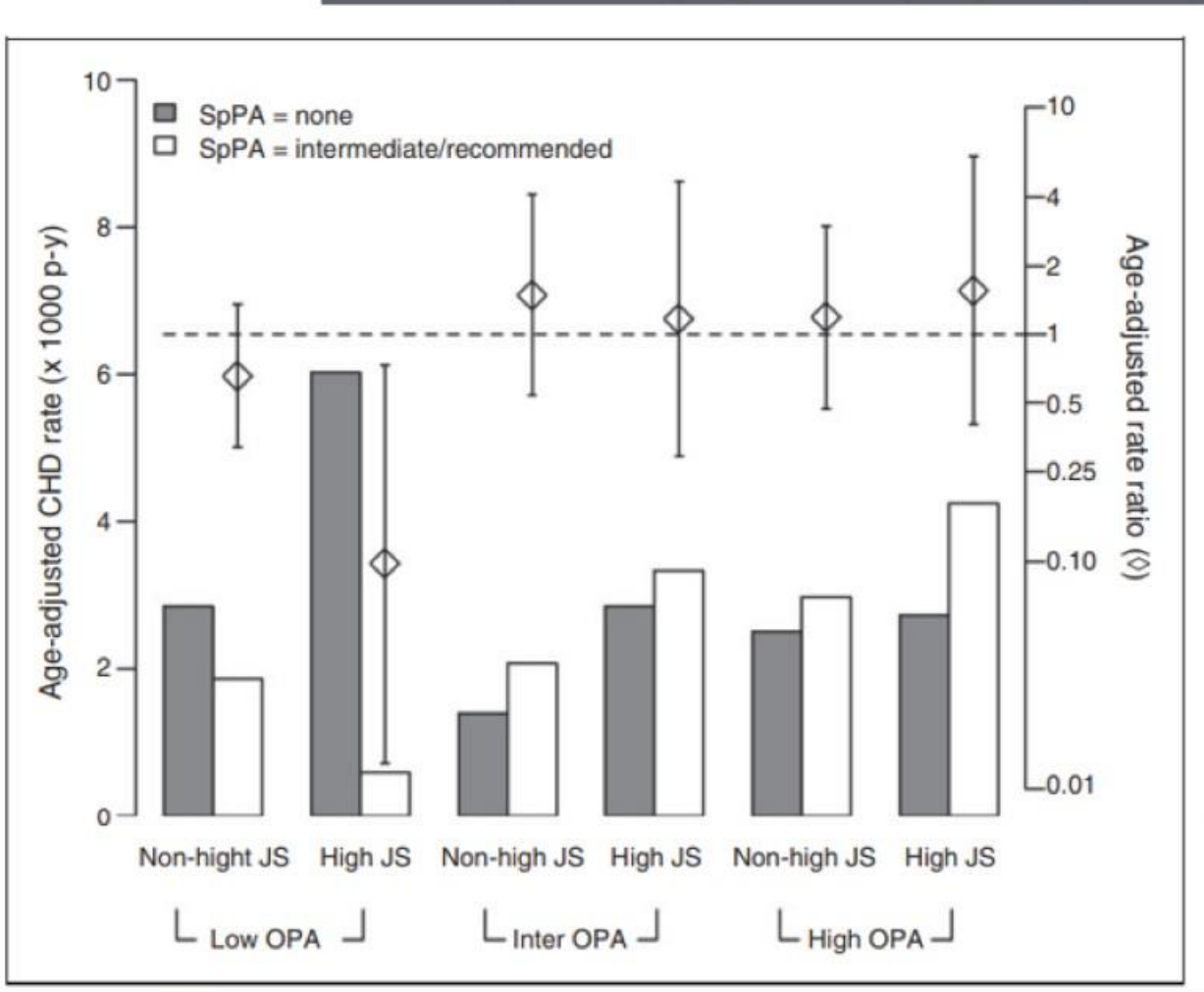

MMA Ferrario. TWH Cardio – Milano, 16 giugno 2023

Joint effect of low OPA and JS on CVD incidence

OPA	JS	All workers HR* (95% CI)	Poor SpPA HR* (95% CI)
Low	Non-High	1.57 (0.94; 2.64)	1.82 (0.99; 3.34)
Low	High	**2.35 (1.28; 4.32)**	**3.58 (1.80; 7.12)**
Intermediate	Non-High	REF	REF
Intermediate	High	2.05 (0.99; 4.22)	1.99 (0.86; 4.61)
Heterogeneity test p-value †		0.04	0.004
Interaction test p-value ‡		0.48	0.98

*: adjusted for age, cohort, educational level, BMI, TC, HDL-C, SBP, smoking, diabetes and alcohol intake.
†: Wald chi-square test (3 df). ‡: Wald chi-square test (1 df).

Association between OPA, JS and CVD incidence – all workers

	N	# Ev	Rate	Age-adjusted	MRF-adjusted
Occupational PA					
Low	1264	73	3.50	1.45 (0.95; 2.21)	1.45 (0.95; 2.21)
Intermediate	1036	34	2.62	REF	REF
High	1010	47	3.70	1.23 (0.78; 1.94)	1.24 (0.79; 1.97)
p-value				0.22	0.23
Job strain					
Low strain	682	32	2.68		
Active	482	20	2.85	REF	REF
Passive	1203	55	3.13		
High strain	943	47	4.19	**1.50 (1.06; 2.13)**	**1.55 (1.08; 2.21)**
p-value				**0.02**	**0.02**

Rates (x1000 person years) are age-adjusted and estimated at the mean age of 40
Age-adjusted: model with age, cohort, educational level, Occupational PA and Job Strain.
MRF-adjusted: as for the age-adjusted model, plus BMI, TC, HDL-C, SBP, smoking, diabetes and alcohol intake.
p-value: Wald heterogeneity chi-square test (df equal to the number of categories minus 1)

Association between OPA, JS and CVD incidence – Stratified by SpPA

	Poor SpPA		Intermediate or recommended SpPA	
	Rate	**HR* (95%CI)**	**Rate**	**HR* (95%CI)**
Occupational PA				
Low	5.24	**1.84 (1.13; 2.90)**	1.13	0.59 (0.23; 1.54)
Intermediate	3.17	REF	1.76	REF
High	4.01	1.11 (0.66; 1.89)	3.20	1.72 (0.62; 4.78)
p-value		**0.02**		0.11
Job strain				
Non-high strain	3.62	REF	1.92	REF
High strain	5.77	**1.78 (1.20; 2.64)**	1.72	0.89 (0.36; 2.21)
p-value		**0.004**		0.8

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Passive	1203	55	3.13	1.14 (0.73; 1.77)	1.07 (0.69; 1.67)
High strain	943	47	4.19	**1.64 (1.03; 2.60)**	**1.63 (1.02; 2.59)**
p-value				0.14	0.12

Rates (x1000 person years) are age-adjusted and estimated at the mean age of 40
Age-adjusted: model with age, cohort, educational level, Occupational PA and Job Strain.
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Remarks and THMs

Both in the entire sample and in worker with poor SpPA,
we found increased excess risks in sedentary worker with high strain, but we did not found clear interaction effects.

The small sample size should be acknowledge and larger studies are needed.

Interventions at the workplace to improve SpPA and reduce JS in sedentary workers seem preeminent;

while recommending high levels of SpPA should be carefully considered in workers engaged in strenuous work activities.

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ORIGINAL ARTICLE

The contribution of educational class in improving accuracy of cardiovascular risk prediction across European regions: The MORGAM Project Cohort Component

Marco M Ferrario,[1] Giovanni Veronesi,[1] Lloyd E Chambless,[2] Hugh Tunstall-Pedoe,[3] Kari Kuulasmaa,[4] Veikko Salomaa,[4] Anders Borglykke,[5] Nigel Hart,[6] Stefan Söderberg,[7] Giancarlo Cesana,[8] for the MORGAM Project

Heart 2014;100:1179–1187

The aim of the study was to assess whether educational class as an index of socioeconomic position in addition to the SCORE equation improves the prediction of CVD mortality risk across several European populations and regions.

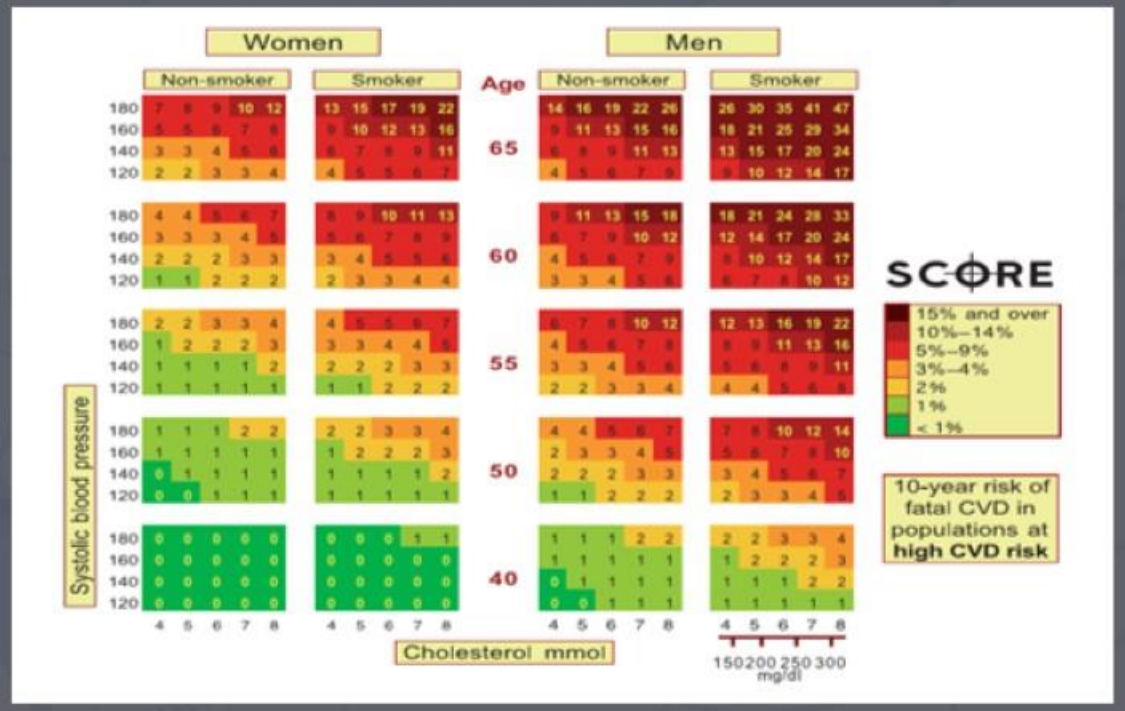
European Heart Journal (2003) 24, 987–1003

ELSEVIER

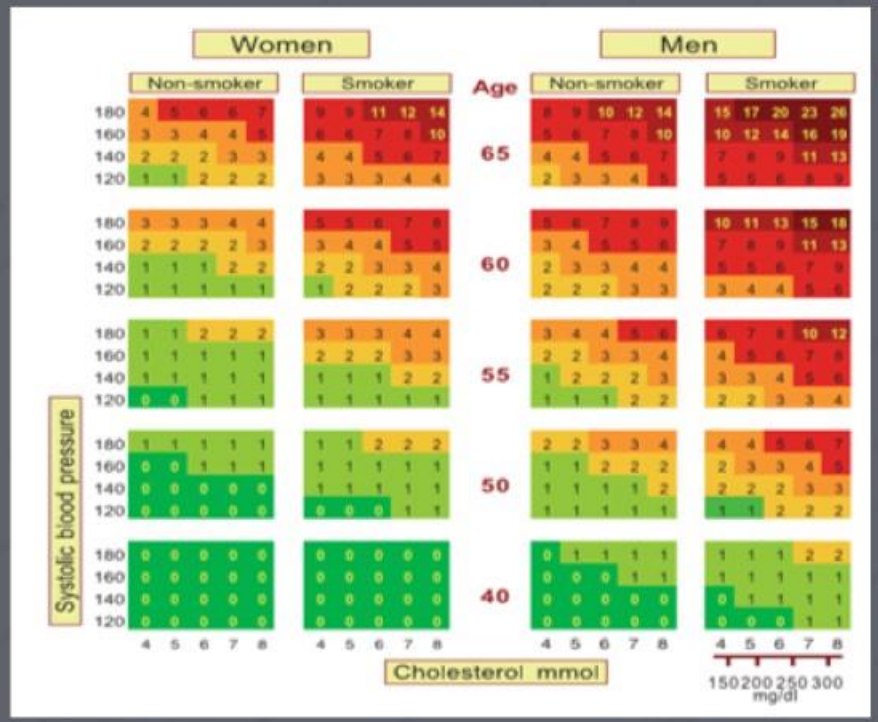
EUROPEAN SOCIETY OF CARDIOLOGY

Estimation of ten-year risk of fatal cardiovascular disease in Europe: the SCORE project

Populations at high CVD risk



Populations at low CVD risk

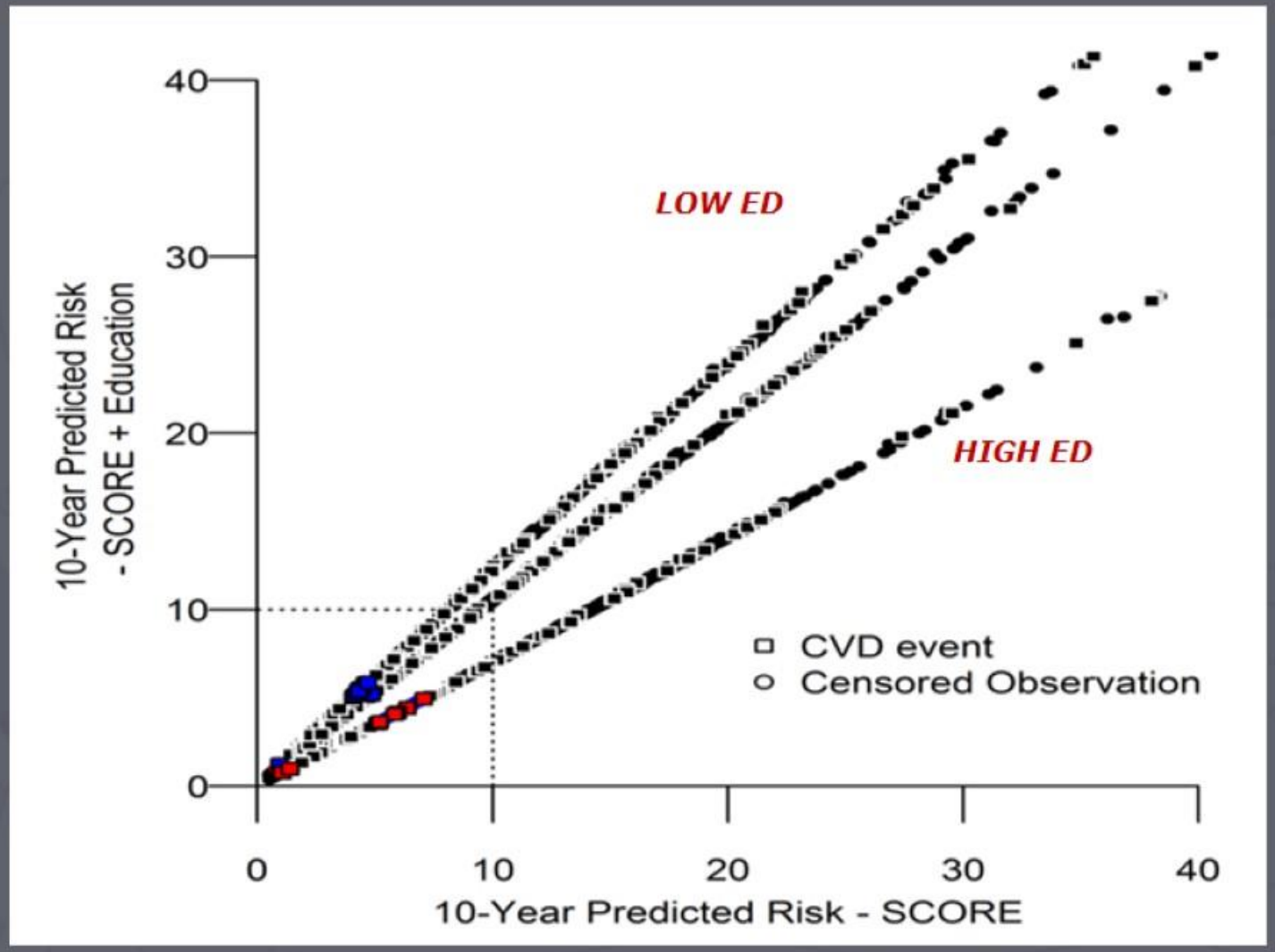


Results – ED–CVD Association (HR and 95%CI)

MEN

Region	Educ	D#/N	Age-Adj	SCORE-Adj
Nordic Countries	Low	139/3725	**1.42 (1.09;1.85)**	1.21 (0.93;1.57)
	Interm	106/2798	**1.35 (1.03;1.78)**	1.23 (0.93;1.62)
	High	99/3801	**REF^**	REF
The UK	Low	116/3111	**1.73 (1.23;2.43)**	**1.54 (1.10;2.17)**
	Interm	61/2065	**1.49 (1.02;2.17)**	**1.32 (0.90;1.92)**
	High	48/2428	**REF‡**	**REF^**
Central Europe	Low	78/4513	1.29 (0.91;1.81)	1.25 (0.89;1.76)
	Interm	65/3957	1.35 (0.95;1.92)	1.32 (0.93;1.88)
	High	60/5078	REF	REF
Eastern Europe and Russia	Low	153/2529	**2.05 (1.57;2.68)**	**1.81 (1.38;2.36)**
	Interm	129/2482	**1.71 (1.29;2.25)**	**1.53 (1.16;2.02)**
	High	83/2728	**REF†**	**REF†**
All European regions	Low	486/13878	**1.64 (1.42;1.90)**	**1.46 (1.26;1.69)**
	Interm	361/11302	**1.48 (1.27;1.73)**	**1.35 (1.16;1.58)**
	High	290/14035	**REF†**	**REF†**

Results – NRI and Clinical NRI in East EU Pops



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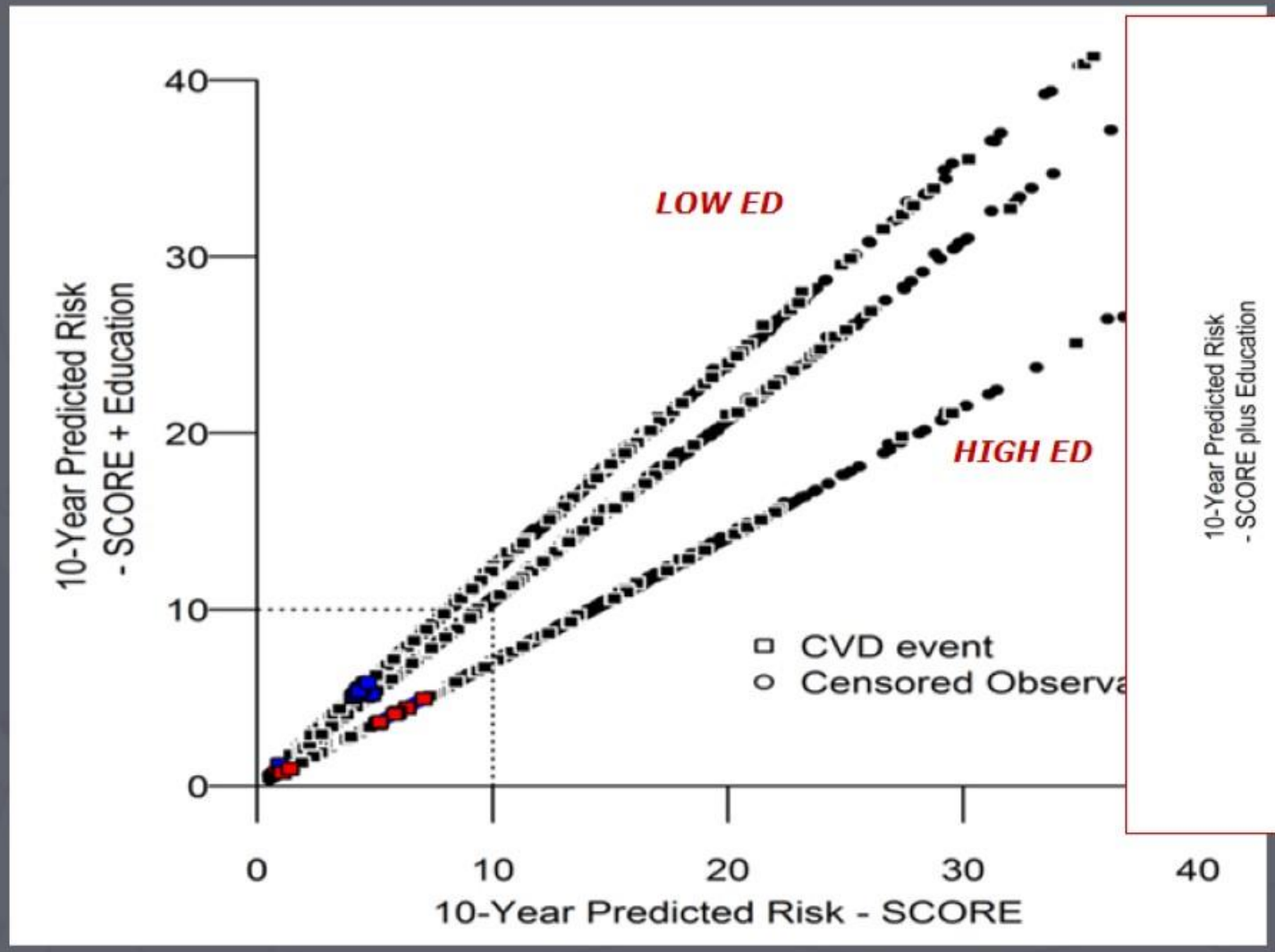

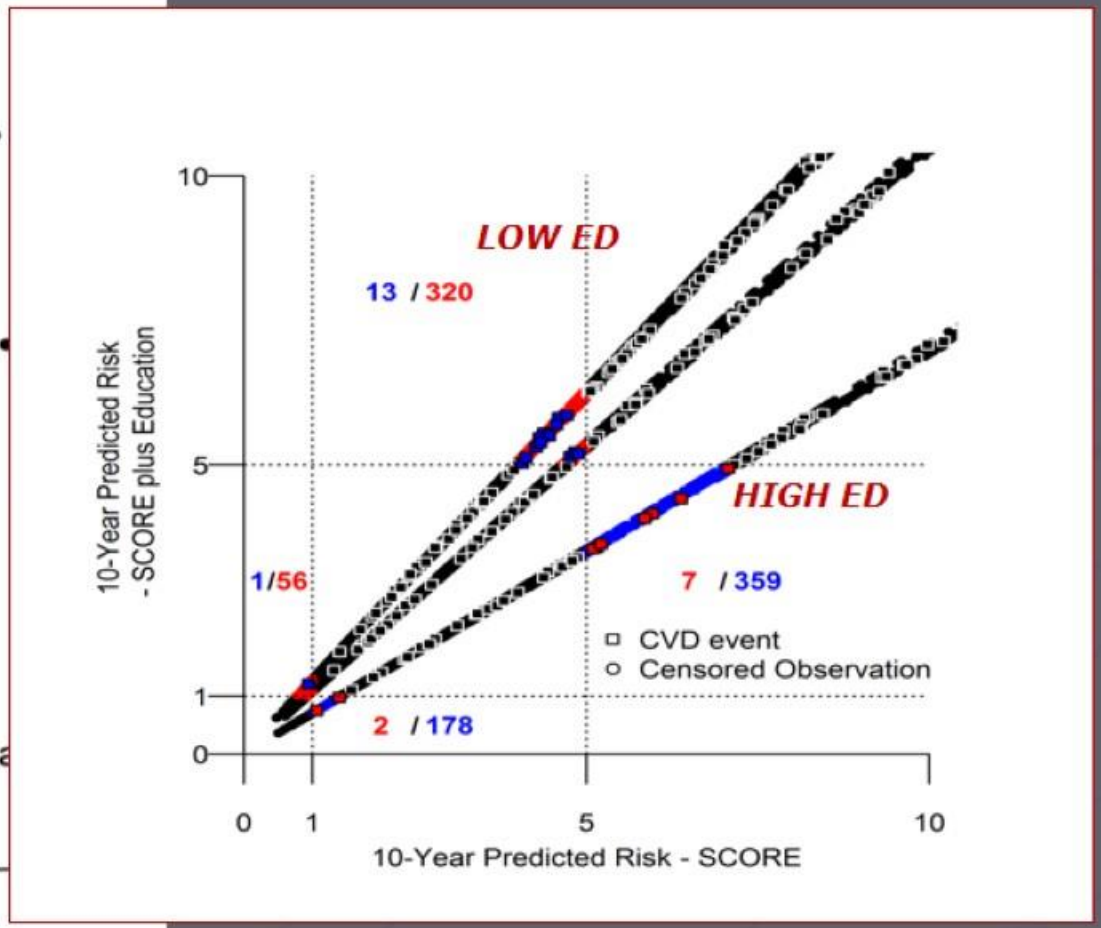

Conclusions

The inclusion of a socioeconomic position indicator in the risk equation is recommended to prevent CVD cases in the lower social classes and to reduce inappropriate treatments in the higher social classes.

The improvement in risk stratification increases social equity and reduces inappropriate treatment in primary prevention.

Further investigations are needed in women.

But, … how to translate this recommendation in practice?

Final remarks – Put the recommendation in practice

1. ***SCORE stratified charts or scores base on SES levels***, in addition to the stratifications now already available

   Not easy to implement in practice: possible discriminations?

2. ***More aggressive treatment threshold for low-SES subjects.***

   Peter Frank et al (2010) suggest to **reduce cholesterol treatment thresholds for low-SES persons** from 10% and 20% CHD risk (Framingham risk score) to 6% and 13% for those with low SES,
   based on this equation:

$$1 - R_{\text{Framingham Risk Score+SES}} = (1 - R_{\text{Framingham Risk Score}})^{H}$$

   where H = adjusted hazard ratio for SES

Final remarks – Put the recommendation in practice

3. Improve intervention in low-SES settings: factories and underprivileged neighbourhoods

It asks for an alliance between CVD preventive cardiologists and occupational physicians

Research report

Changes in traditional risk factors no longer explain time trends in cardiovascular mortality and its socioeconomic differences

K Harald, S Koskinen, P Jousilahti, J Torppa, E Vartiainen, V Salomaa

J Epidemiol Community Health 2008;62:251–257

Conclusions: Changes in traditional risk factors no longer provide a good explanation of the changes in cardiovascular mortality and its socioeconomic differences. However, risk factors did explain the cardiovascular mortality decline among lower socioeconomic groups.

Esplorare le interazioni tra FdR CVD lavorativi e non

- Il job-strain è un FrR CVD, e per chi?
- Attività fisica sportiva e del tempo libero riduce il rischio CVD in tutti i lavoratori indistintamente dal livello di attività fisica lavorativa?
- Quali relazioni tra attività fisica lavorativa, sportiva e job strain?
- Il rischio CVD è uguale in tutte le classi socio-economiche? Indicazioni per la prevenzione CVD in ambito lavorativo
- Accuratezza prognostica di interventi sui FdR lavorativi e Life-style. Una prospettiva per il Medico del Lavoro

ESC European Society of Cardiology

European Heart Journal (2023) **44**, 1594–1607
https://doi.org/10.1093/eurheartj/ehad161

STATE OF THE ART REVIEW
Ischaemic heart disease

Proteomics and lipidomics in atherosclerotic cardiovascular disease risk prediction

Nick S. Nurmohamed [1,2], Jordan M. Kraaijenhof [1], Manuel Mayr [3,4], Stephen J. Nicholls [5], Wolfgang Koenig [6,7,8], Alberico L. Catapano [9,10], and Erik S.G. Stroes [1]*

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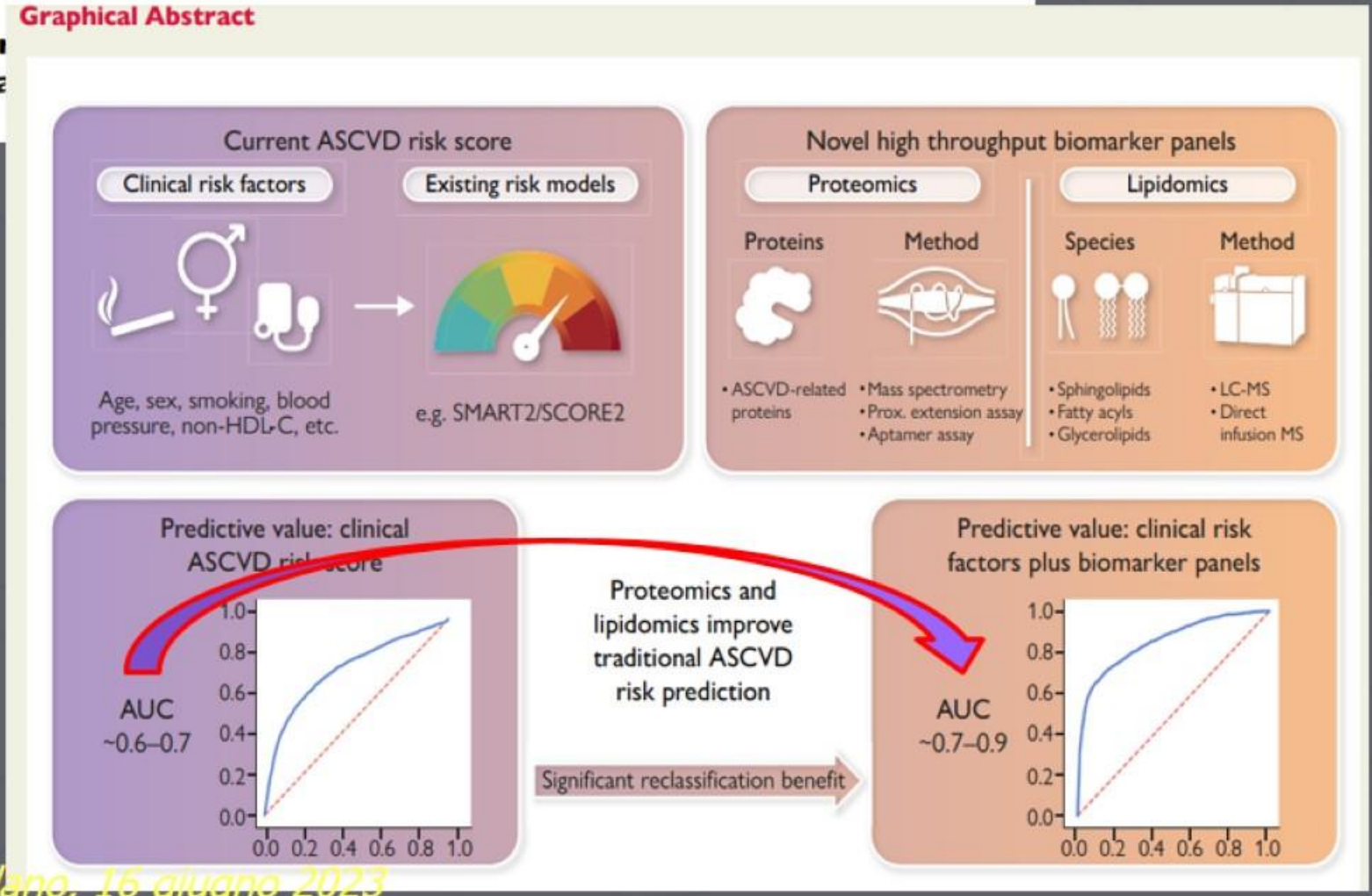
Graphical Abstract



JAMA Cardiology | Original Investigation

Cardiovascular Disease Risk Assessment Using Traditional Risk Factors and Polygenic Risk Scores in the Million Veteran Program

Jason L. Vassy, MD, MPH, MS; Daniel C. Posner, PhD; Yuk-Lam Ho, MPH; David R. Gagnon, MD, PhD, MPH; Ashley Galloway, MPH; Vidisha Tanukonda, MD; Serena C. Houghton, PhD, MPH; Ravi K. Madduri, PhD; Benjamin H. McMahon, PhD; Philip S. Tsao, PhD; Scott M. Damrauer, MD; Christopher J. O'Donnell, MD, MPH; Themistocles L. Assimes, MD; Juan P. Casas, MD, PhD; J. Michael Gaziano, MD, MPH; Michael J. Pencina, PhD; Yan V. Sun, PhD; Kelly Cho, PhD, MPH; Peter W.F. Wilson, MD

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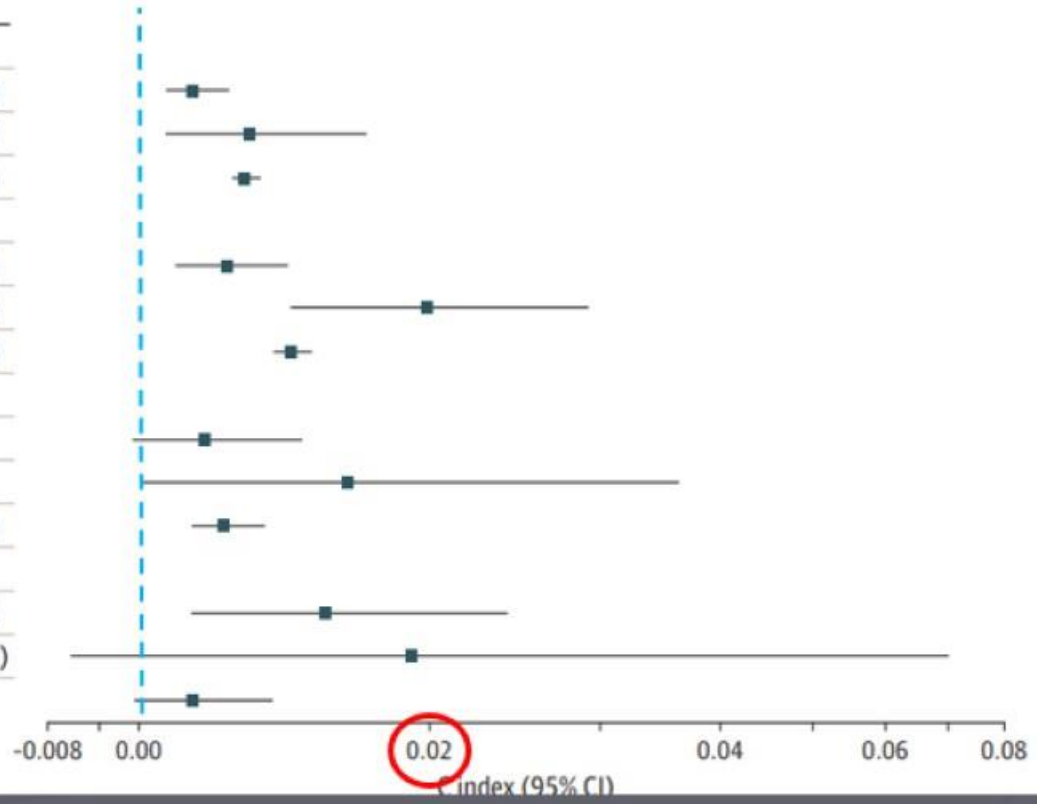
C Change in C index (95% CI) after addition of polygenic scores to the traditional risk

Subgroup	C index (95% CI)
Composite CVD	
Black	0.004 (0.002 to 0.006)
Hispanic	0.008 (0.002 to 0.016)
White	0.007 (0.006 to 0.008)
Myocardial infarction	
Black	0.006 (0.002 to 0.010)
Hispanic	0.020 (0.010 to 0.031)
White	0.010 (0.009 to 0.012)
Ischemic stroke	
Black	0.004 (0 to 0.011)
Hispanic	0.014 (0 to 0.037)
White	0.006 (0.004 to 0.009)
ASCVD death	
Black	0.013 (0.004 to 0.025)
Hispanic	0.019 (-0.005 to 0.056)
White	0.004 (0 to 0.009)



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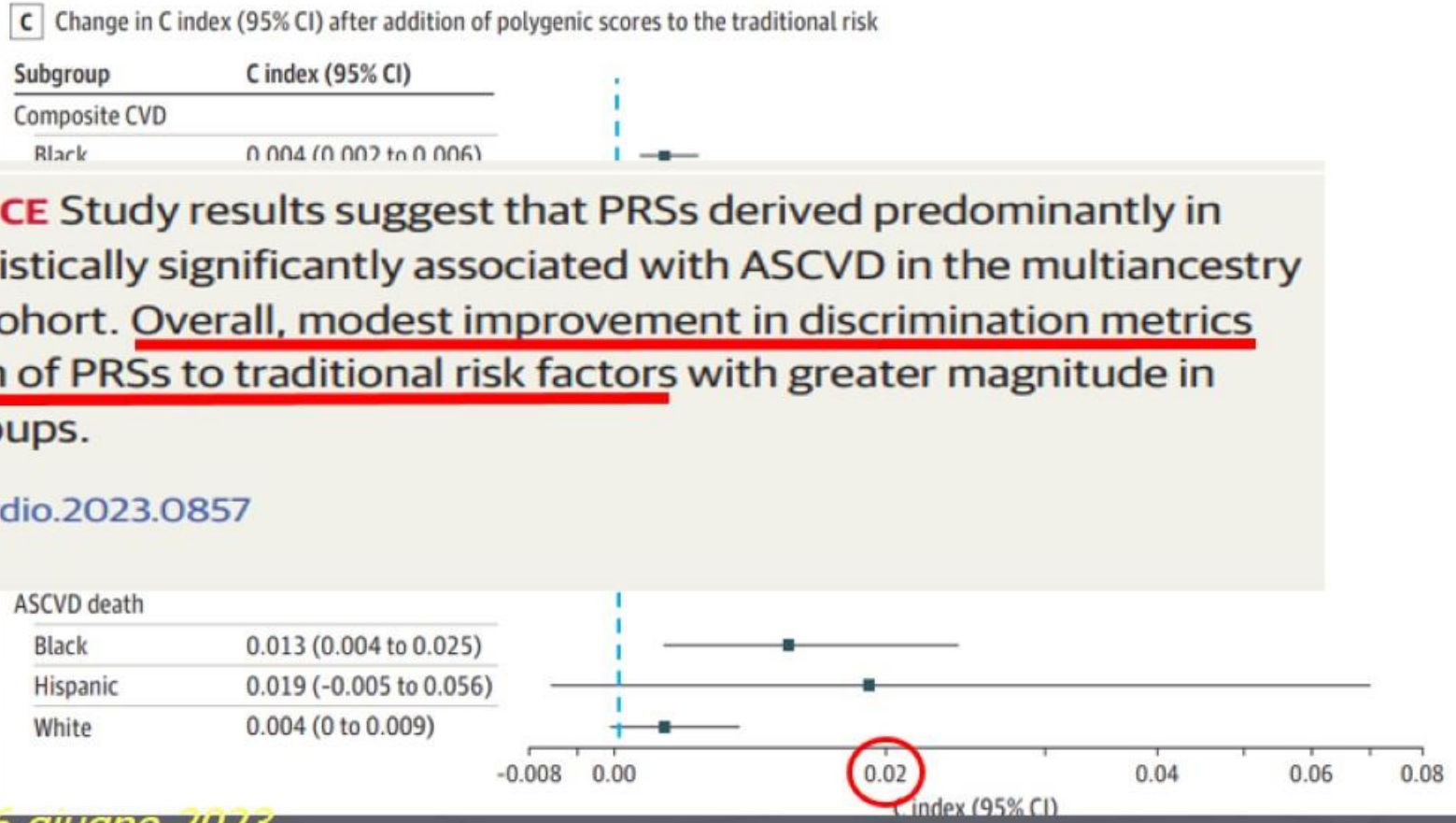

CONCLUSIONS AND RELEVANCE Study results suggest that PRSs derived predominantly in European samples were statistically significantly associated with ASCVD in the multiancestry midlife and older-age MVP cohort. Overall, modest improvement in discrimination metrics were observed with addition of PRSs to traditional risk factors with greater magnitude in women and younger age groups.

JAMA Cardiol. doi:10.1001/jamacardio.2023.0857
Published online May 3, 2023.

International Journal of Public Health (2018) 63:723–732
https://doi.org/10.1007/s00038-018-1118-2

ORIGINAL ARTICLE

Cardiovascular disease prevention at the workplace: assessing the prognostic value of lifestyle risk factors and job-related conditions

Giovanni Veronesi[1] · Rossana Borchini[2] · Paul Landsbergis[3] · Licia Iacoviello[1,4] · Francesco Gianfagna[1,4] · Patrick Tayoun[5] · Guido Grassi[6,7] · Giancarlo Cesana[8] · Marco Mario Ferrario[1,2] on behalf of The Cohorts Collaborative Study in Northern Italy (CCSNI) Research Group

Received: 30 November 2017 / Revised: 23 April 2018 / Accepted: 15 May 2018 / Published online: 25 May 2018

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Table 3 Calibration and discrimination ability at 10 years for incident cardiovascular disease risk estimation models based on lifestyle risk factors and job-related conditions (LS&JRC), and for a conventional risk model including blood lipids, blood pressure, smoking and diabetes. Brianza (Northern Italy), 1989–2008

	Calibration	Discrimination[a]			
		AUC (95% CI)		Δ-AUC[b] (95% CI)	
M1: age, smoking status	10.9	0.724	(0.684; 0.759)	REF	
M2: M1 + sport PA, alcohol consumption	6.0	0.734	(0.692; 0.764)	0.010	(0.002; 0.019)
M3: M1 + occupational PA, job strain	16.6	0.736	(0.691; 0.767)	0.012	(0.004; 0.021)
M4: M1 + combined occupational and sport PA, alcohol consumption and job strain	14.3	0.753	(0.700; 0.780)	0.028	(0.011; 0.04)
M5: M1 + total cholesterol, HDL-cholesterol, systolic blood pressure and diabetes	10.7	0.753	(0.713; 0.779)	0.029	(0.012; 0.044)

Calibration: Gronnesby–Borgan goodness-of-fit Chi-square value. A value below 17 is considered indication of model fit

All models additionally include a dummy variable to indicate study type (population- vs. factory-based cohort)

AUC area under the receiver operating characteristic curve, *CI* confidence interval, *PA* physical activity, *HDL* high-density lipoprotein

[a]Evaluated at 10 years. 95% CI from bootstrapping (n = 2000 runs)

[b]From Model 1

Questo modello che combina «work-related» ed abitudini comportamentali evidenzia la stessa accuratezza predittiva di CT, HDL, PA e diabete!

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La AUC incrementa di 0,02 da modello con età, fumo ,sport PA e consumo eccessivo di alcol ad un modello con l'aggiunta di job strain e attività fisica occupazionale

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Table 5 Discrimination and clinical utility parameters for the risk estimation model based on lifestyle risk factors and job-related conditions (LS&JRC), among workers without clinical CVD risk factors or at low CVD risk according to guidelines. Brianza (Northern Italy), 1989–2008

	N	# events	Observed 10-years risk	AUC	Workers with LS&JRC risk above the observed 10-year risk[a]					
					N	%	Sensitivity	Specificity	NNS	Net Benefit (95% CI)
Total cholesterol < 240 mg/dl	1811	95	3.4	0.754	695	38.4	0.719	0.628	15.6	1.19 (0.57; 2.01)
Systolic BP < 140 mmH, no treatment	908	51	3.3	0.743	406	44.7	0.830	0.566	16.2	1.32 (0.47; 2.78)
No diabetes	2447	145	4.0	0.753	822	33.6	0.665	0.678	12.6	1.38 (0.64; 2.05)
Low CVD risk[a]	1832	91	3.3	0.745	687	37.5	0.746	0.638	15.2	1.27 (0.68; 2.16)

10-year predicted CVD risk from the SCORE model < 1% and no diabetes

LS&JRC model: including age, alcohol intake, combined occupational and sport PA, smoking, job strain. The model additionally includes a dummy variable to indicate study type (population- vs. factory-based cohort)

NNS number needed to screen in order to identify 1 future CVD case within 10 years

[a]Observed 10-year risk in the group, as estimated from Kaplan–Meier (column 4 in this table)

Inoltre, interventi su fumo, job strain, attività fisica occupazionale e sportiva e consumo di alcol nei soggetti a basso rischio CVD, mantiene una elevata potenzialità preventiva

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ORIGINAL ARTICLE

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Received: 30 November 2017 / Revised: 23 April 2018 / Accepted: 15 May 2018 / Published online: 25 May 2018

Conclusions: LS&JRC are as accurate as clinical risk factors in identifying future cardiovascular events among working males. Our results support initiatives to improve total health at work as strategies to prevent cardiovascular disease.

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Pre-pandemic burnout and its changes during the COVID-19 outbreak as predictors of mental health of healthcare workers: A lesson to be learned

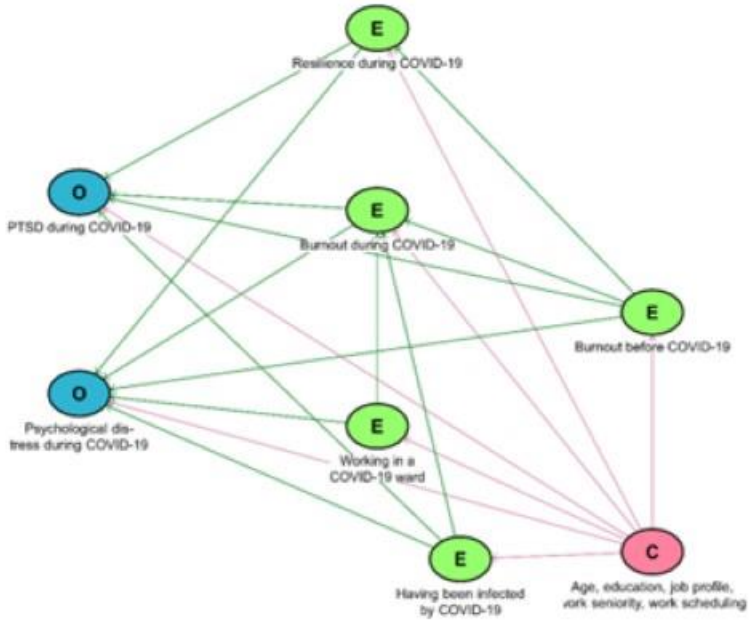
Emanuele Maria Giusti [a], Giovanni Veronesi [a], Camilla Callegari [b], Rossana Borchini [c], Gianluca Castelnuovo [d, e], Francesco Gianfagna [a, f], Licia Iacoviello [a, g], Marco Mario Ferrario [a, *]

Quali informazioni della pandemia COVID-19 sulla salute mentale degli operatori sanitari?

Questi effetti sulla salute mentale, è noto hanno effetti anche sul sistema CVD!

Figure 1

Directed acyclic graph representing the a priori hypothesized relationships between the study variables



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Pre-pandemic burnout and its chang
predictors of mental health of health

Emanuele Maria G
Gianluca Castelnu [e], Francesco Gianfagna

Results of regression models employed to assess the predictive effect of burnout before and during COVID-19 and resilience on PTSD symptoms and psychological distress.

Variable	PTSD		Psychological distress	
	β[a]	[95% CI]	β[b]	[95% CI]
MBI - EE before COVID-19	0.52	[0.42, 0.63]*	0.55	[0.46, 0.65]*
MBI - DEP before COVID-19	0.04	[−0.06, 0.15]	0.03	[−0.06, 0.12]
MBI - PPA before COVID-19	0.09	[−0.03, 0.21]	0.13	[0.02, 0.24]*
MBI - ΔEE	0.54	[0.45, 0.64]*	0.53	[0.44, 0.62]*
MBI - ΔDEP	0.10	[0.01, 0.19]*	0.07	[−0.01, 0.16]
MBI - ΔPPA	0.17	[0.05, 0.29]*	0.29	[0.19, 0.40]*
CD-RISC-10 - Resilience	−0.10	[−0.27, 0.07]	−0.25	[−0.41, −0.09]*

Note. MBI = Maslach Burnout Inventory; EE = emotional exhaustion; DEP = depersonalisation; PPA = poor personal accomplishment; ΔEE = change in EE over time; ΔDEP = change in DEP over time; ΔPPA = change in PPA over time.

[a] Coefficients are standardised and adjusted for age, educational attainment, job profile, work seniority and work scheduling.

[b] Coefficients are standardised and adjusted for age, educational attainment, job profile, work seniority, having worked in a COVID-19 ward and having been infected by COVID-19.

Livelli pre-Covid e variazioni pre-durante Covid di Esaurimento Emotivo, hanno le stesse relazioni con DTSD e Distress Psicologico (GHQ-12) durante pandemia

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Pre-pandemic burnout and its chang
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Nessun effetto su MH di livelli pre-Covid di Depressione.

Relazioni solo tra variazioni dei livelli di Depressione e PTSD.

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Pre-pandemic burnout and its chang
predictors of mental health of health

Emanuele Maria Giusti[a], Giovanni Veronesi[a], C
Gianluca Castelnuovo[d,e], Francesco Gianfagna

Scarsa Realizzazione Personale pre-Covid ha effetti sul distress psicologico durante.

E variazioni della stessa hanno effetti maggiori su entrambe gli outcome di MH.

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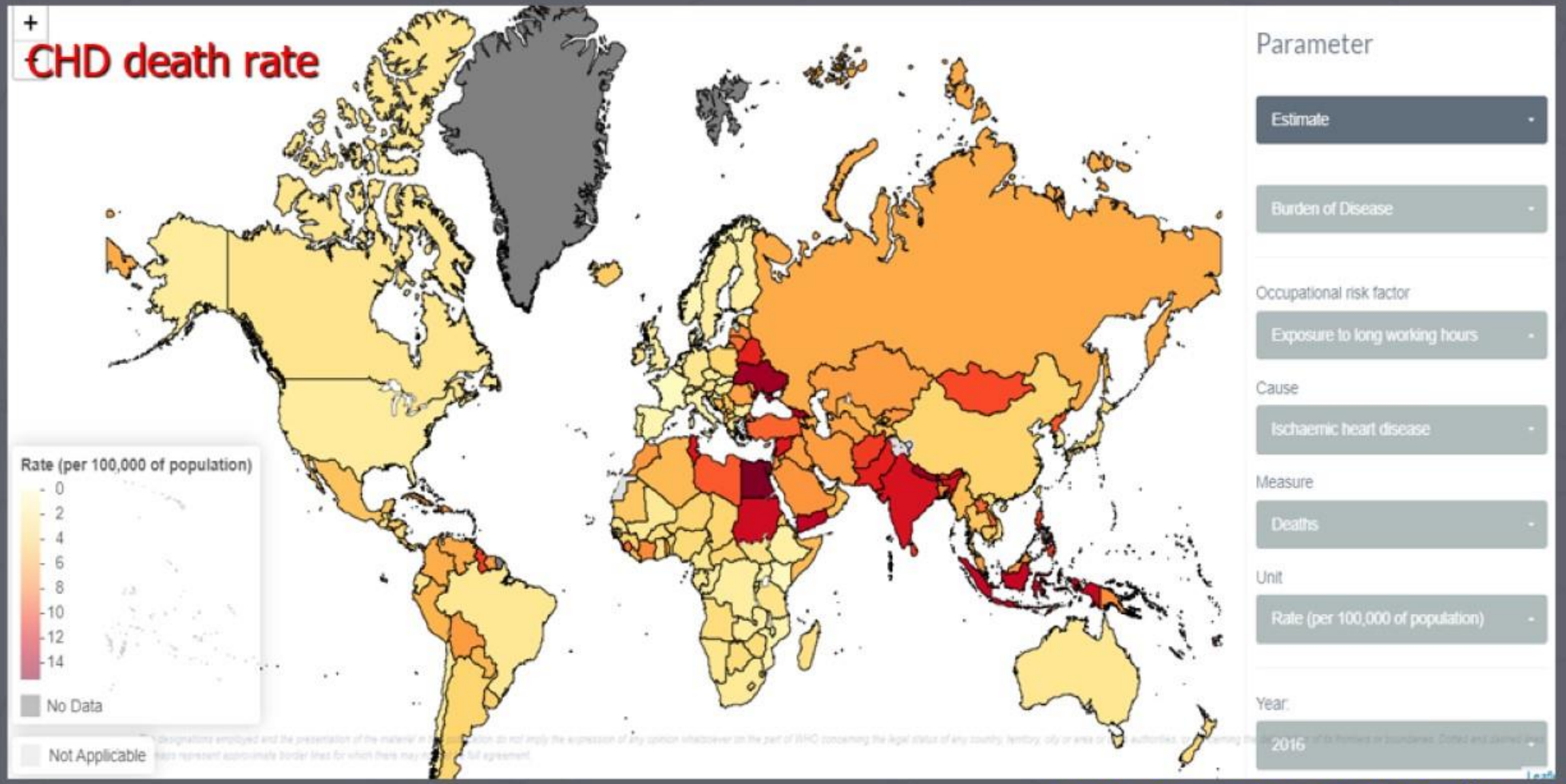
sociated with lower psychological distress (-0.25). Preventive actions aimed at reducing EE, e.g., addressing organisational dysfunctions, are needed to mitigate the impact of future crises, whereas improving personal accomplishment levels is a key target to protect HCWs from mental health disorders during a pandemic.

LWH and CVD outcomes – WHO-ILO

Bull World Health Organ 2023;101:418–430Q | doi: http://dx.doi.org/10.2471/BLT.23.289703

- https://who-ilo-joint-estimates.shinyapps.io/OccupationalBurdenOfDisease/



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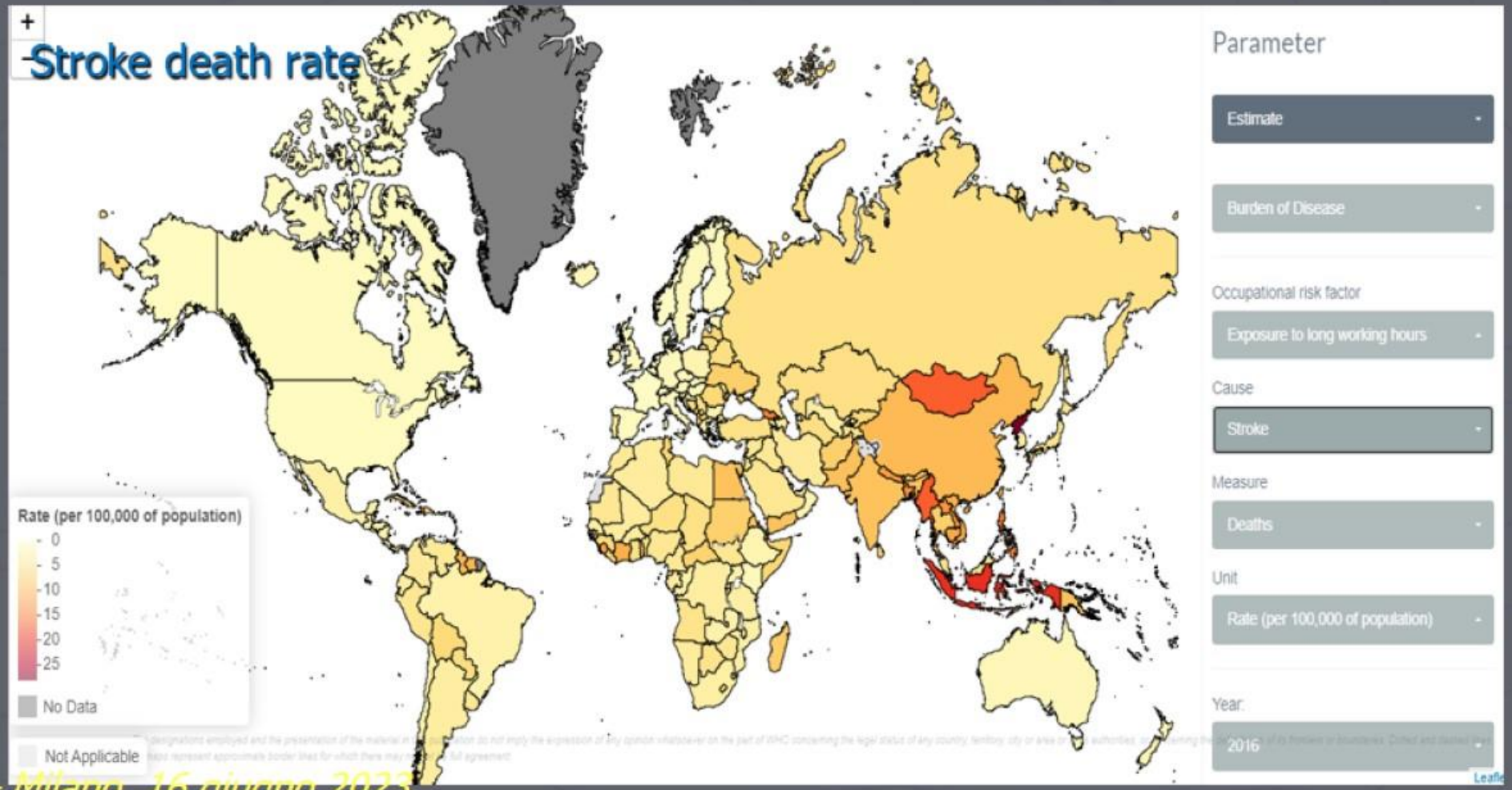


Special Session Title: **Recognised Occupational CVD risk factors: time to start a prevention Total Worker Health approach?**

Presenters / topics *(3 to 5 presentations per SS)*:

- Work stress and CVD risk: reasons for, and evidence of interventions.
  Johannes Siegrist, Institute of Medical Sociology, University Clinic Düsseldorf, Düsseldorf, Germany
- Long Working Hour and CVDs. Are there different thresholds?
  Jian Li, Fielding School of Public Health, University of California Los Angeles, USA
- Shift work and CVD: Current evidences and guidelines for prevention.
  Els Clays, Department of Public Health and Primary Care, Ghent University, Ghent, Belgium.
- The Physical activity Paradox in Cardiovascular health: Evidence and prevention.
  Andreas Holtermann, National Research Centre for the Working Environment, Copenhagen, Denmark
- Evidence-based Total Worker Health approach to prevent CVDs.
  MM Ferrario, Research Centre EPIMED, University of Insubria at Varese, Italy

Moderators:
Akizumi Tsutsumi, Department of Public Health, Kitasato University, Sagamihara, Japan
Franca Barbic, Department of Biomedical Sciences, Humanitas University, Milan, Italy

Special Session Title: **Exploring pathways linking working physical and mental demanding and CVDs: new insights on the role of the cardiovascular autonomic nervous system**

Presenters / topics *(3 to 5 presentations per SS)*:

- **Cardiovascular autonomic control as a link between occupational risk factors and cardiovascular disease: focus on work stress.**
  Franca Barbic; Cardiovascular Autonomic Disorders Unit and Occupational Medicine; Humanitas Research Hospital, Rozzano and Humanitas University, Department of Biomedical Sciences, Pieve Emanuele, Milan, Italy

- **The interplay between autonomic nervous system and inflammation: effects of sleep deprivation and shift work on cardiovascular risk.**
  Eleonora Tobaldini, Department of Internal Medicine, Fondazione IRCCS Ca' Granda, Ospedale Maggiore Policlinico and Department of Clinical Sciences and Community Health, University of Milan, Italy.

- **Wearable sensors and AI methodologies to combine bio signals of cardiovascular and nervous system functioning: new monitoring perspectives in workplace.**
  Leandro Pecchia, Electronic and informatics bioengineering, University UNICAMPUS, Rome; Biomedical Engineering and Management of Healthcare Services, University of Warwick, UK.

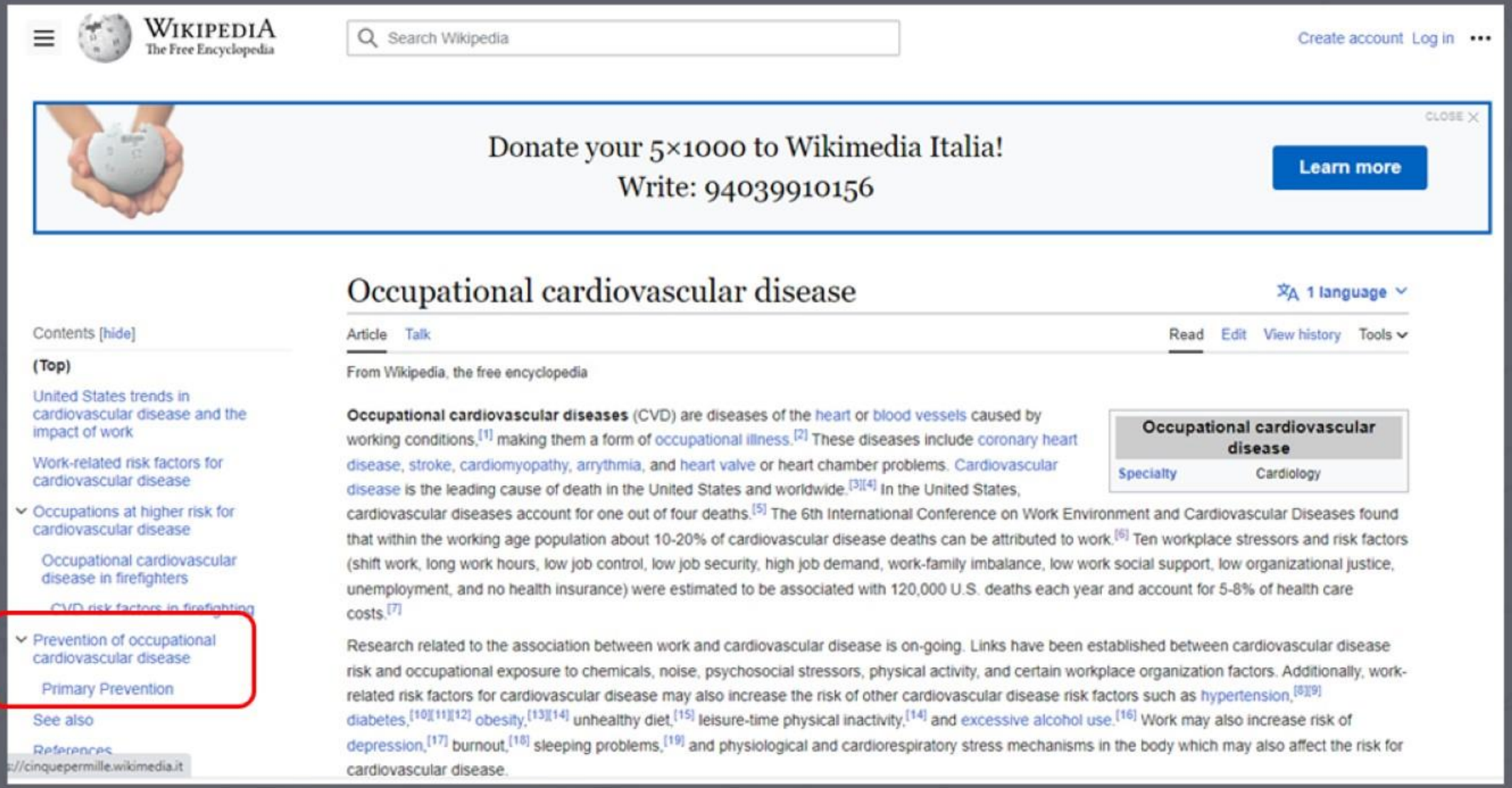
- **(In)voluntary telework during the COVID-19 pandemic: relationship with indicators of autonomic activity during work, leisure, and sleep.**
  David Hallman, Department of Occupational health science and psychology, University of Gävle, Sweden.

- **Investigations of heart rate variability for disentangling mechanisms in the occupational physical activity paradox.**
  Mette Korshøj, Department of Occupational and Social Medicine, Holbæk Hospital, a part of Copenhagen University Hospital, Denmark.

Moderators:
Andreas Holtermann National Research Centre for the Working Environment, Copenhagen, Denmark
Marco M. Ferrario Research Centre EPIMED, University of Insubria at Varese, Italy

Cardiology in Occupational Health on Wikipedia

https://en.wikipedia.org/wiki/Occupational_cardiovascular_disease)



This is a cornflower
We have lost it in our fields

We hope it will come back,

... as Occupational Medicine among clinical sciences and practices...

Grazie dell'attenzione

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