The role of physical activity in prevention and recovery from COVID-19 and the measures introduced to address the pandemic

Professor Nanette Mutrie - 5 minutes- introduction

Professor Sebastien Chastin - 10 minutes – immune function

Dr Paul Kelly - 10 minutes – physical activity

Dr Claire Fitzsimons 10 mins – sedentary behaviour

Questions and discussion – 20 minutes

Physical Activity for Health Research Centre (PAHRC)

Aim
to develop, test and implement interventions which encourage people of all ages to sit less and move more

Key Research Themes

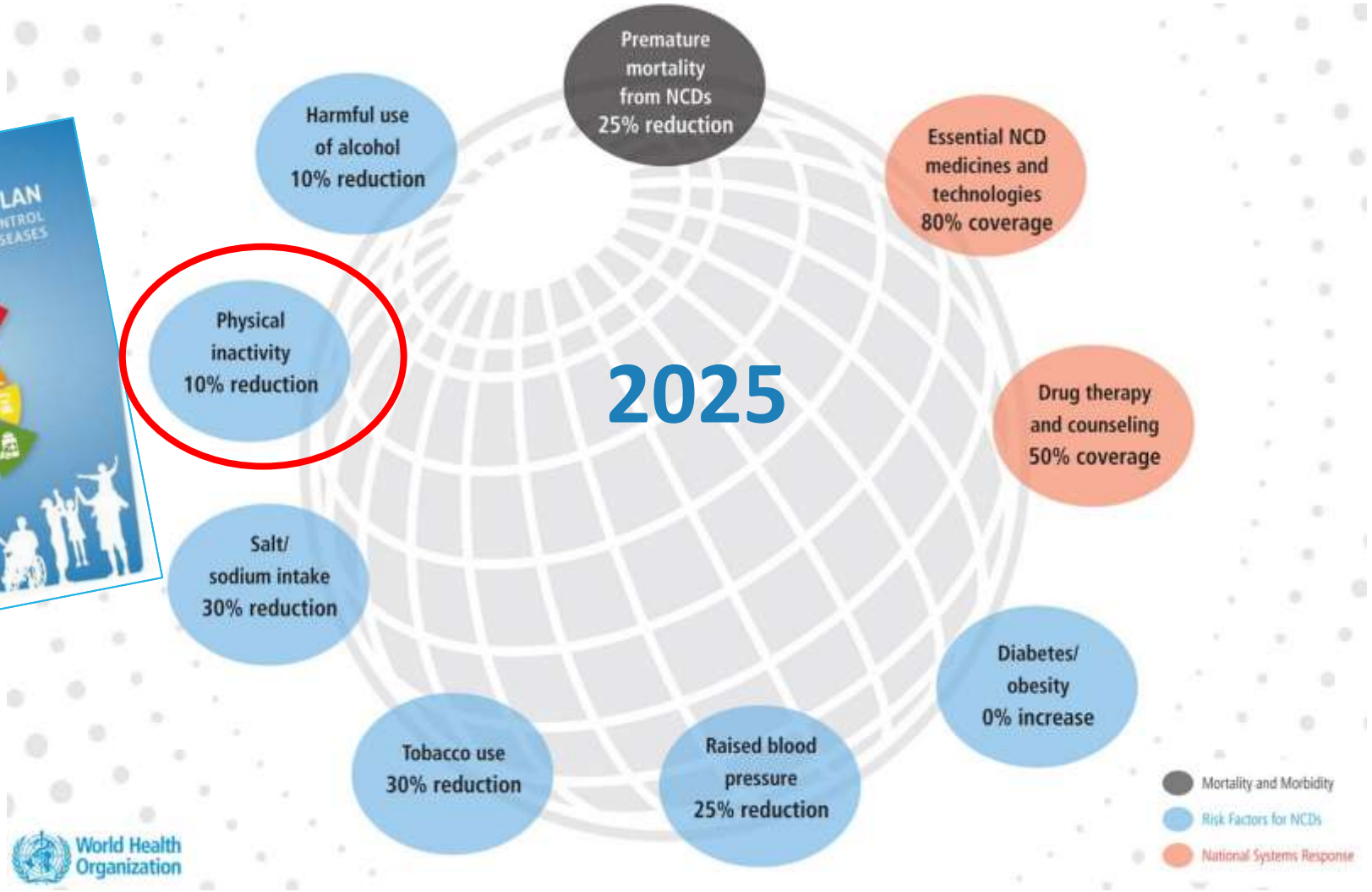
1. The promotion of walking & cycling
2. The investigation of sedentary behaviour
3. Physical activity amongst key ‘at risk’ groups
4. Measurement & Surveillance
5. Communication of key messages
6. Evaluation

www.ed.ac.uk/education/pahrc
Email: pahrc@ed.ac.uk
Twitter: @UoE_PARHC

Background

- Physical activity has considerable evidence that it can prevent and treat most **Non Communicable Diseases [NCDs]** – see for example the US Surgeon General's Report 2018 https://www.cdc.gov/nccdphp/sgr/summary.htm
- WHO global plan focused on **NCDs** and **reducing Physical Inactivity** is one of 9 targets

Global targets for NCDs



Infographic on the Chief Medical Officers' guidelines

Source:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/829884/3-physical-activity-for-adults-and-older-adults.pdf

Nov 28 2016

Action on Physical Activity can contribute to achieving 8SDG

Covid 19

- What has been less well known [up until now] is the role in communicable diseases such as COVID viruses [SEB]
- The importance of PA for mental and physical health during lockdown was emphasized by all CMOs of UK saying one reason to leave house was to exercise
- Some people may benefit from increased PA during COVID restrictions but others will find this difficult and this might lead to health inequalities [PAUL]
- An overlooked aspect of the guidelines for PA during COVID restrictions is the recommendation to minimize sitting time [CLAIRE]

Physical Activity, risk of infection and the immune system

Prof Seb Chastin

Glasgow Caledonian University

Ghent University

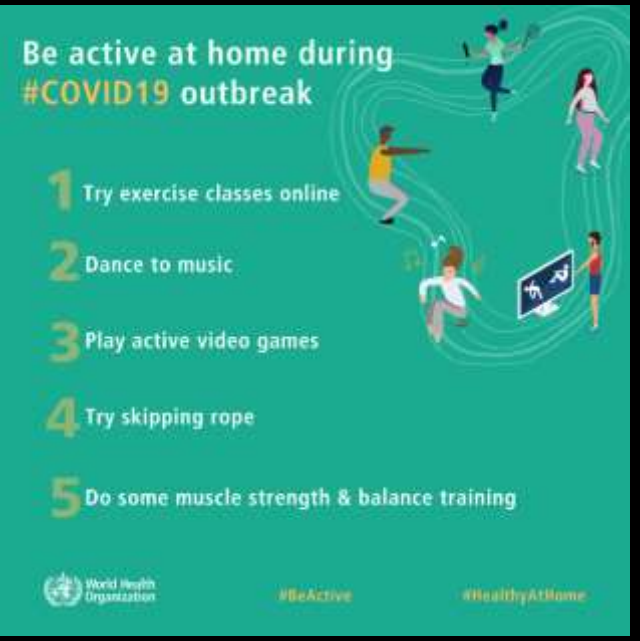
Physical activity and Non-Communicable Diseases

6-10% of NCDs

5.3 million death per annum

Lee et al. Lancet 2012

Is PA also protective against infectious diseases?



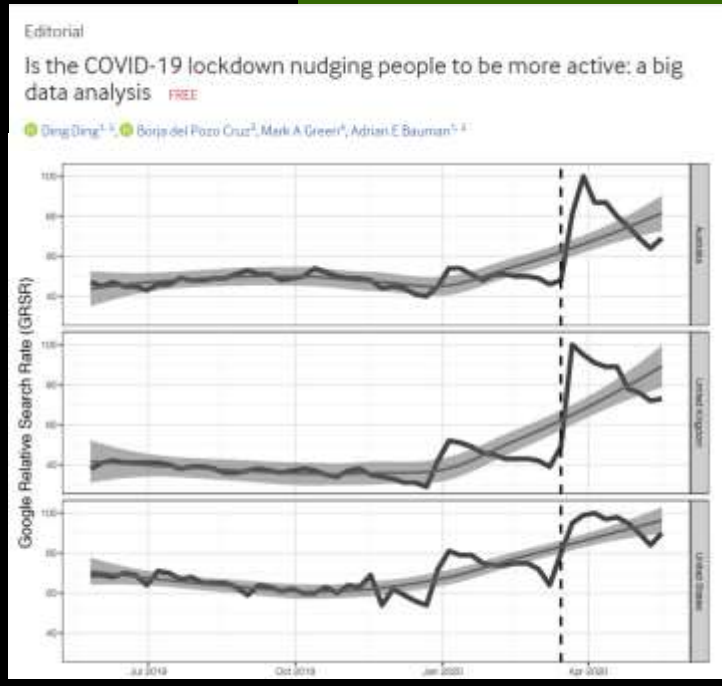
Stamatakis et al. The Conversation 2020

Coronavirus: Parks must stay open during COVID-19 crisis 'for health of the nation'

sky news

April 2020

British Journal of Sports Medicine



Journal of Sport and Health Science
Volume 9, Issue 4, July 2020, Pages 293-301

Review

Coronavirus disease-2019: A tocsin to our aging, unfit, corpulent, and immunodeficient society

David C. Nieman

Commentary

Physical activity/inactivity and COVID-19

Antonio Crisafulli[1] and Pasquale Pagliaro[2]

European Journal of Preventive Cardiology

ESC European Society of Cardiology

SAGE

EVIDENCE ????

Elsevier Public Health Emergency Collection

Public Health Emergency COVID-19 Initiative

Med Hypotheses. 2020 Sep; 142: 109835.
Published online 2020 May 12. doi: 10.1016/j.mehy.2020.109835

PMCID: PMC7217098
PMID: 32428811

Exercise as medicine for COVID-19: An ACE in the hole?

Kevin S. Heffernan[a,*] and Sae Young Jae[b]

Elsevier Public Health Emergency Collection

Public Health Emergency COVID-19 Initiative

Med Hypotheses. 2020 Oct; 143: 109854.
Published online 2020 May 20. doi: 10.1016/j.mehy.2020.109854

PMCID: PMC7237357
PMID: 32464492

Can moderate intensity aerobic exercise be an effective and valuable therapy in preventing and controlling the pandemic of COVID-19?

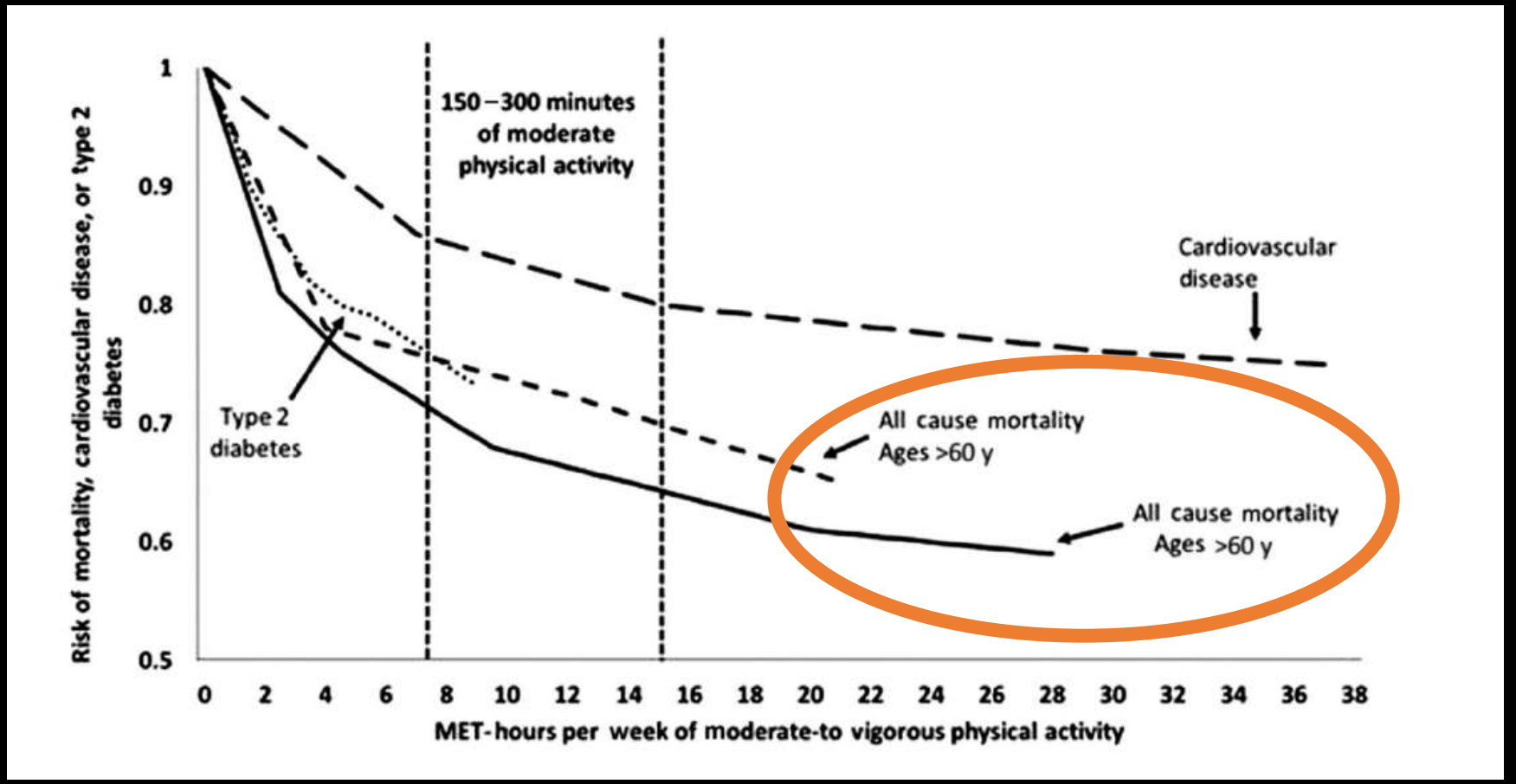
Snehil

Journal of Physical Activity and Health, 2019, 16, 1-11
https://doi.org/10.1123/jpah.2018-0618

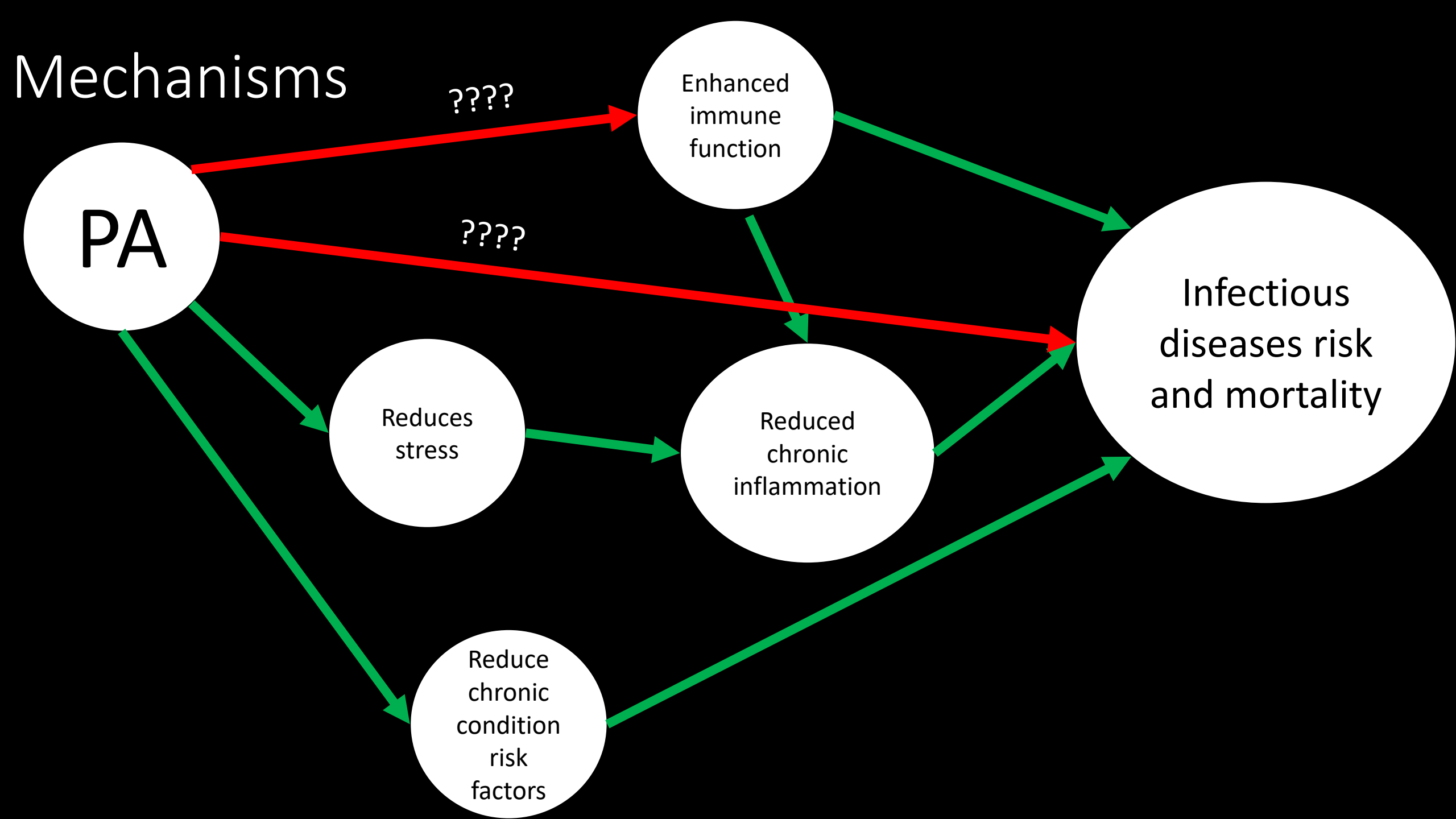
Human Kinetics
ORIGINAL RESEARCH

The Scientific Foundation for the *Physical Activity Guidelines for Americans*, 2nd Edition

Kenneth E. Powell, Abby C. King, David M. Buchner, Wayne W. Campbell, Loretta DiPietro, Kirk I. Erickson, Charles H. Hillman, John M. Jakicic, Kathleen F. Janz, Peter T. Katzmarzyk, William E. Kraus, Richard F. Macko, David X. Marquez, Anne McTiernan, Russell R. Pate, Linda S. Pescatello, and Melicia C. Whitt-Glover



Mechanisms


????
Enhanced immune function
PA
????
Infectious diseases risk and mortality
Reduces stress
Reduced chronic inflammation
Reduce chronic condition risk factors

Team

Seb Chastin

Ukay Abaraogu

Philippa Dall

Elaine Duncan

Joanna McParlan

Nicola Roberts

Jan Bourgois

Jasmien Dumortier

Mar Hamer

Jennifer Darnborough

David Jiménez Pavón

Aim

To examine and summarise evidence about the association between habitual physical activity

1) the risk of community acquired infectious disease
2) markers of immune function
3) immune response to vaccination.

Proviso

Started April 2020 completed 6th June 2020

UNPUBLISHED

BMJ

Lancet

JAMA

Nature

BJSM

“Physical activity not a priority!”

Methods

Design: Systematic review – Meta-analysis (PRISMA) -> pre registered PROSPERO

Inclusion: Prospective studies, longitudinal studies, RCTs comparing different level of PA. Adult population (> 18years age)

Exclusion: Elite athletes, studies on immediate effect of PA on immune function

Databases: MEDLINE, Embase, Cochrane CENTRAL, Web of Science, CINAHL, PsycINFO, and SportDiscus from January 1980 until 14 April 2020

Outcomes: Marker of immune function (cell counts/concentration),

Information flow

Screening: 16,698 articles

Full texts: 606

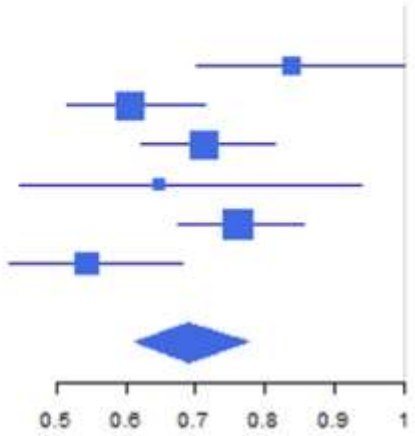
Included: 55 studies

- 7 prospective studies (risk infectious disease/mortality)
- *42 RCTs (Immune function)*
- *6 RCTs (Vaccination)*

Results – PA and Risk of Infectious Diseases

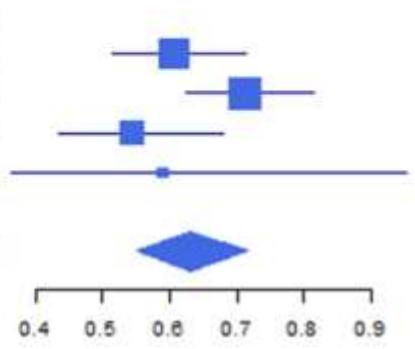
a) Risk of infectious disease

Study	Hazard Ratio	Lower limit	Upper limit	p value
Baik et al 2000	0.838	0.702	1.001	0.05188
Hamer et al 2019	0.606	0.515	0.714	0
Inoue et al 2007	0.712	0.623	0.815	0
Paulsen et al 2017	0.647	0.447	0.938	0.02147
Wang et al 2014	0.76	0.676	0.855	1e-05
Williams et al 2014	0.544	0.434	0.68	0
Summary	**0.69**	**0.612**	**0.777**	**0**



b) Risk of infectious disease mortality

Study	Hazard Ratio	Lower limit	Upper limit	p value
Hamer et al 2019	0.606	0.515	0.714	0
Inoue et al 2007	0.712	0.623	0.815	0
Williams et al 2014	0.544	0.434	0.68	0
Paulsen et al 2017	0.59	0.365	0.953	0.03116
Summary	**0.629**	**0.551**	**0.717**	**0**



Results – PA and Immune system

<u>Intervention Characteristics. CONTROL NO PA</u>

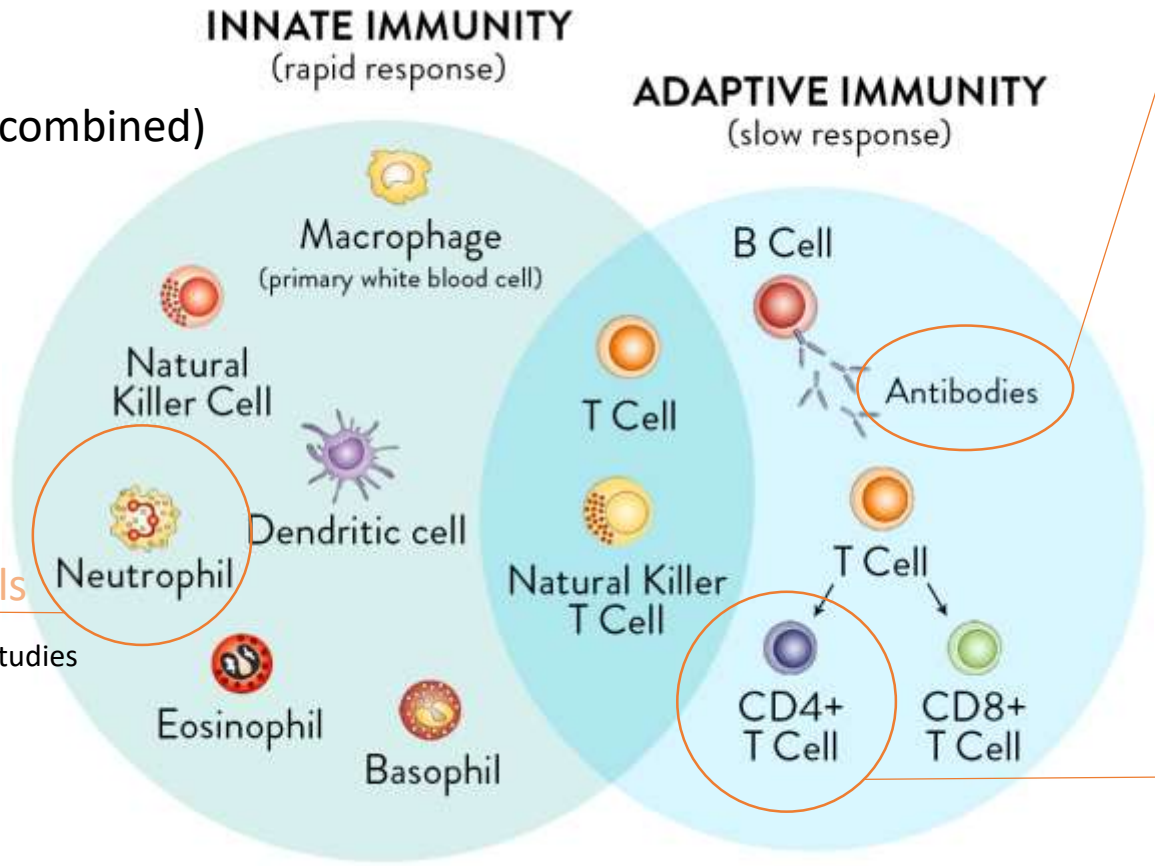
Frequency: 3-5 /week

Intensity: MVPA

Time: 30-60 minutes

Type: Any (strength, aerobic, combined)

Duration: median 8 weeks



First line of defence (mucosal)

IgA: SMD 0.311 (CI 0.131 0.491), N=11 studies

40 to 70% of white blood cells

MD 704 cells/µL (CI 68 1340), N = 6 studies

Immuno-surveillance

MD 32 cells/µL (CI 7 – 56), N = 24 studies

PA and vaccination (Antibody titres)

Intervention Characteristics (PRIOR TO VACCINATION) CONTROL NO PA

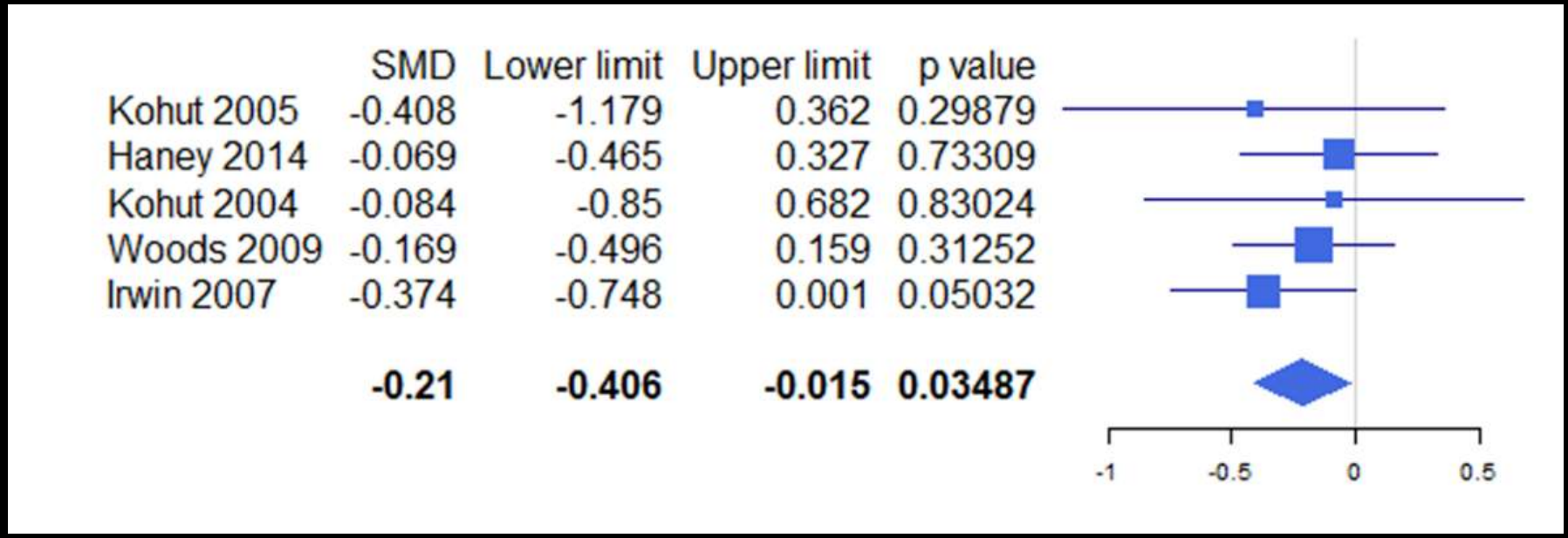
Frequency: median 3/week

Intensity: MVPA

Time: median 60 minutes

Type: Any (strength, aerobic, combined)

Duration: median 20 weeks



Conclusion

PA protective against infectious disease/mortality

PA improves immune function

- First line of defence in mucosal barriers
- Immunosurveillance
- Overall decrease in innate/rapid response needed

PA enhance response to vaccination

Contact

Sebastien.Chastin@gcu.ac.uk

USHER INSTITUTE COVID-19 WEBINAR

The role of physical activity in recovery from COVID-19 pandemic measures

Dr Paul Kelly

PAHRC

Institute for Sport, Physical Education and Health Sciences

Sept 2020

1. Physical inactivity is a leading health risk factor?

Physical Inactivity: a risk factor comparable to smoking

Note – different to sedentary behaviour

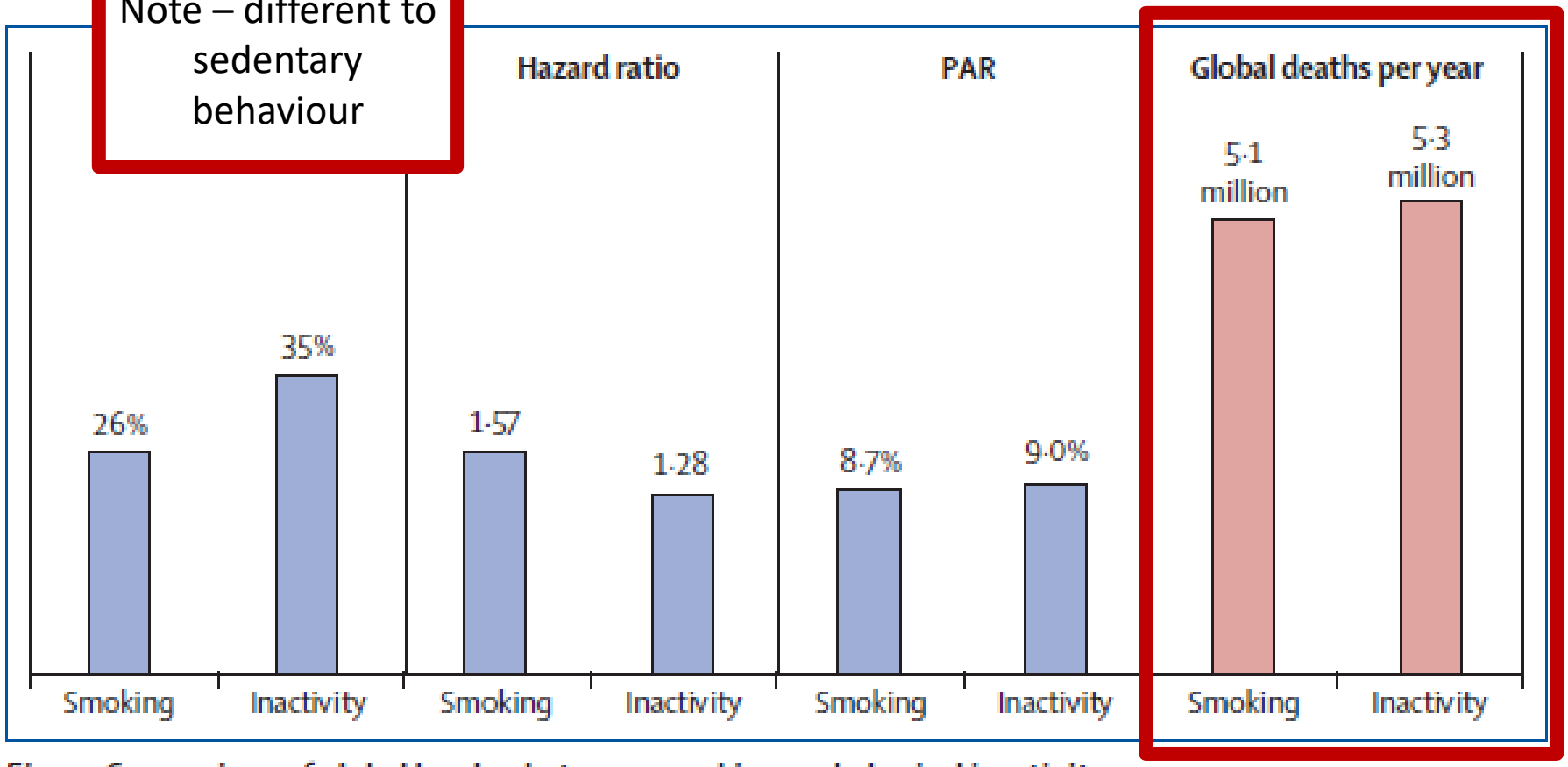


***Figure*: Comparison of global burden between smoking and physical inactivity**

Prevalence of smoking, population attributable risk (PAR), and global deaths for smoking were obtained from WHO.[7] Hazard ratio for all-cause mortality of smoking was obtained from meta-analysis studies.[8,9] All inactivity data were obtained from Lee and colleagues.[5]

Lancet, 2012; http://dx.doi.org/10.1016/S0140-6736(12)61031-9

THE LANCET
Global Health

Use of the prevented fraction for the population to determine deaths averted by existing prevalence of physical activity: a descriptive study

Tessa Strain, Søren Brage, Stephen J Sharp, Justin Richards, Marko Tainio, Ding Ding, Jacques Benichou, Paul Kelly

3·9 million (95% CI 2·5–5·6) premature deaths averted annually by physical activity

https://www.sciencedirect.com/science/article/pii/S2214109X20302114

THE LANCET
Global Health

Country	Prevalence of activity (95% confidence intervals)	Prevalence of activity amongst those that died (95% confidence intervals)	Main adjusted estimate (0% activity counterfactual)[a]	Unadjusted estimate (0% activity counterfactual)[b]	Partially adjusted estimate (0% activity counterfactual)[c]	Adjusted estimate (54.3% active counterfactual)[d]	Number of deaths averted between ages of 40-74 years (thousands)
Sweden	76.9 (71.1-81.8)	69.4 (62.6-75.3)	16.3 (11.1-21.4)	24.6 (19.9-29.1)	16.8 (11.8-21.6)	5.8 (3.6-8.2)	4.6
Switzerland	76.3 (69.7-81.8)	68.6 (61.0-75.3)	16.0 (10.9-21.1)	24.3 (19.7-28.8)	16.7 (11.6-21.5)	5.6 (3.3-8.1)	3.4
	64.1 (57.1-70.6)	54.8 (47.5-62.0)	13.3 (9.0-17.8)	20.5 (16.5-24.7)	14.0 (9.8-18.2)	2.4 (0.6-4.5)	

26,600 premature deaths prevented each year by physical activity in the United Kingdom

https://www.sciencedirect.com/science/article/pii/S2214109X20302114

2. WHAT ARE THE KEY BENEFITS?

Evidence for health outcomes of physical activity

Premature mortality

Cardiovascular diseases

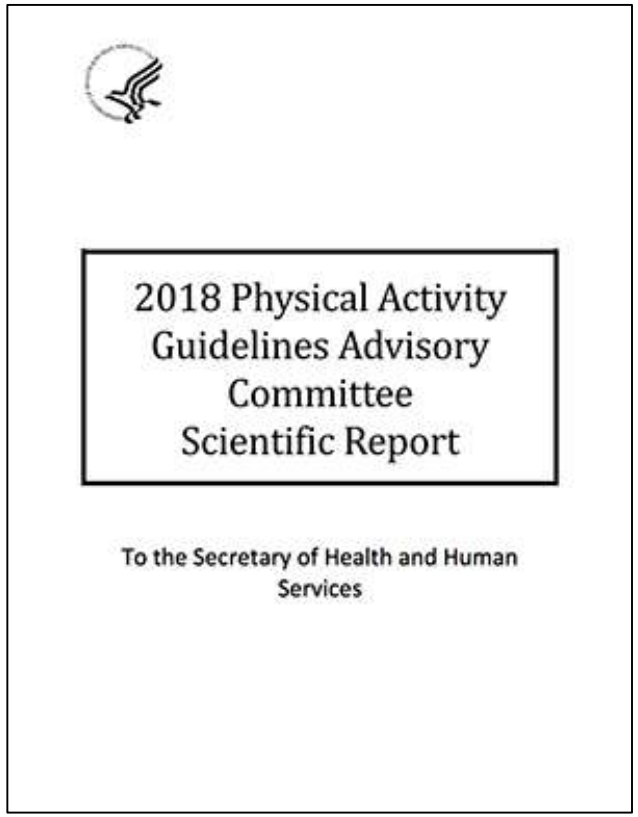
Obesity

Diabetes (Type II)

Cancer

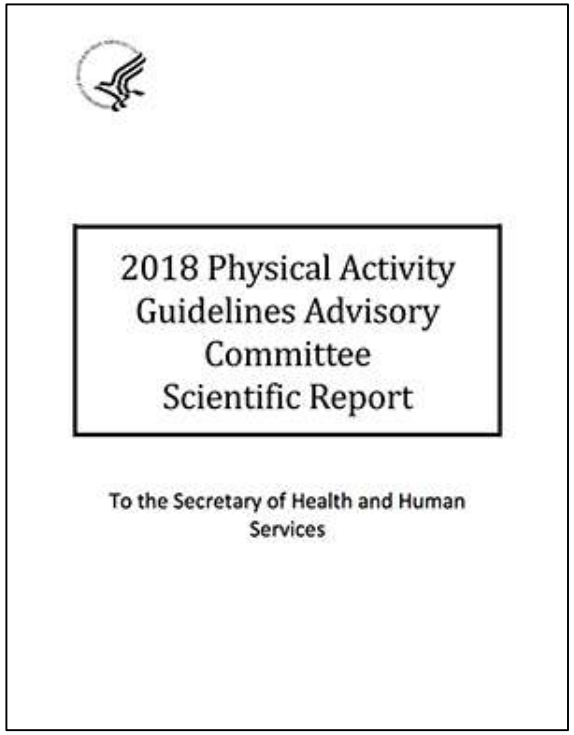
Joint and bone health

Brain Health/Mental health



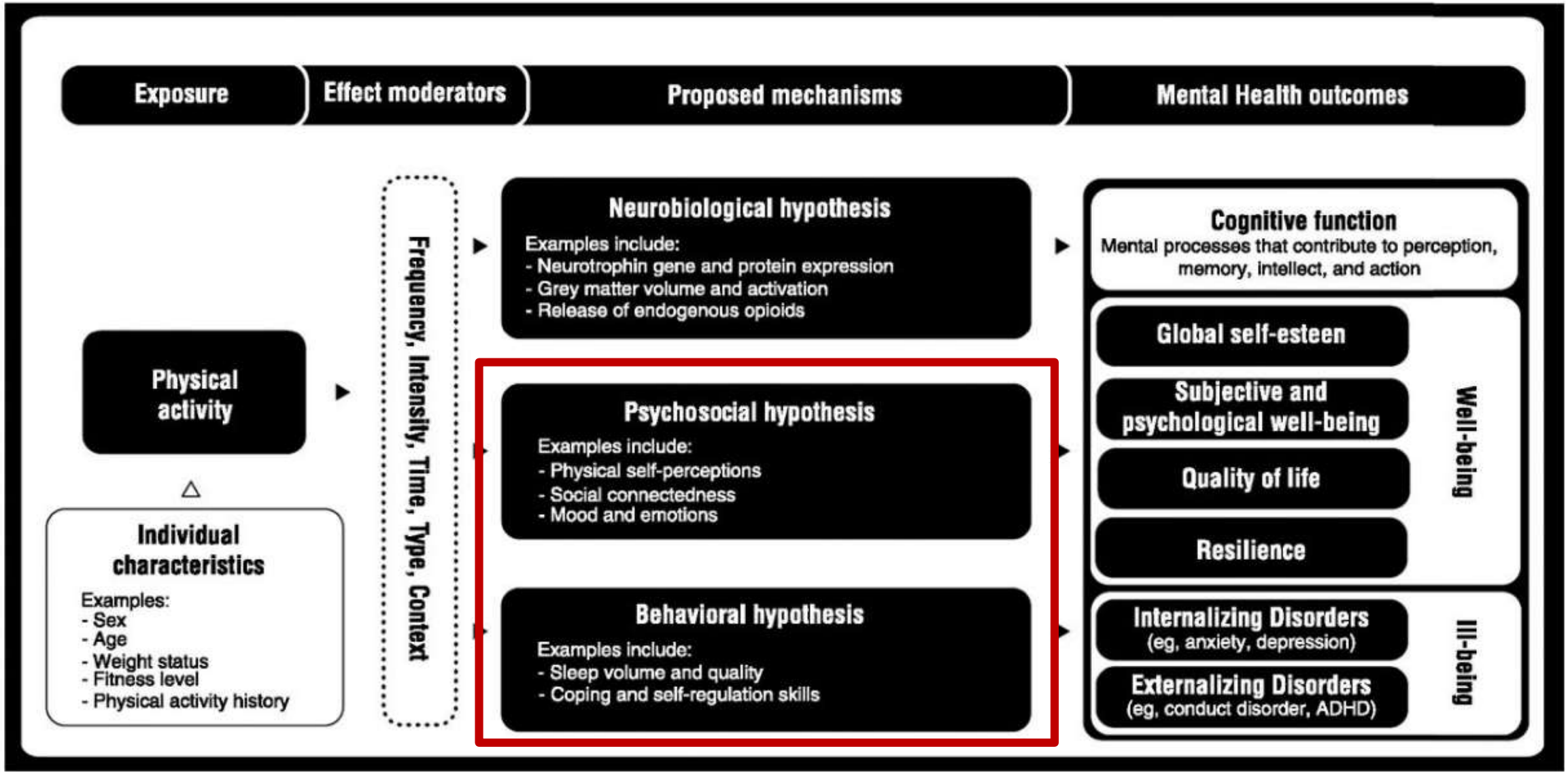
https://health.gov/paguidelines/second-edition/report.aspx

Mental Health and well-being benefits



- Quality of life
- Reduced risk of depression
- Reduced depressive symptoms
- Anxiety symptoms
- State anxiety

https://health.gov/paguidelines/second-edition/report.aspx



Pediatrics. 2016 Sep;138(3). pii: e20161642. doi: 10.1542/peds.2016-1642. Epub 2016 Aug 19.

Physical Activity for Cognitive and Mental Health in Youth: A Systematic Review of Mechanisms.

Lubans D[1], Richards J[2], Hillman C[3], Faulkner G[4], Beauchamp M[4], Nilsson M[5], Kelly P[6], Smith J[7], Raine L[3], Biddle S[8].

https://www.ncbi.nlm.nih.gov/pubmed/27542849

Health

"Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity..."

World Health Organisation

IMPACT OF COVID

How has the pandemic changed things?

3. COVID Recovery

What is the role of physical activity?

Individual recovery?

- Different levels of COVID severity (long COVID)
- Activities of daily living (making a cup of tea, using the stairs, washing)
- Strength and balance
- Deconditioning
- Lung function, breathlessness and and cardio-respiratory fitness

Still feeling the effects?

Find out how you can manage the wide ranging effects of COVID that you may still be feeling.


Breathlessness


Fatigue


Cough


Managing Your Oxygen


Taste and Smell


Voice and Swallowing


Musculoskeletal, Shoulder and Back Pain


Managing Fear and Anxiety


Managing Your Mood and Coping with Frustration


Memory and Concentration

https://www.yourcovidrecovery.nhs.uk/

Getting Moving Again | Your CO

yourcovidrecovery.nhs.uk/your-wellbeing/getting-moving-again/

Research About Feedback Contact

Your COVID Recovery

What is COVID-19? Managing The Effects Your Wellbeing Your Road To Recovery NHS

Getting Moving Again

Your Wellbeing

Why is getting moving again important?

After being in hospital for a period of time, your muscles will be much weaker than normal and you will certainly be less fit than you were.

It is important to get back to your previous level of activity or possibly aim to be more active!

https://www.yourcovidrecovery.nhs.uk/your-wellbeing/getting-moving-again/

New Online | Views 100,692 | Citations 0 | Altmetric 1123

Viewpoint

JAMA Cardiology

May 13, 2020

A Game Plan for the Resumption of Sport and Exercise After Coronavirus Disease 2019 (COVID-19) Infection

Dermot Phelan, MD, PhD[1]; Jonathan H. Kim, MD, MSc[2]; Eugene H. Chung, MD, MSc[3]

https://jamanetwork.com/journals/jamacardiology/fullarticle/2766124

https://www.thelancet.com/journals/lanres/article/PIIS2213-2600(20)30175-2/fulltext

Population level recovery?

- Have activity levels (and patterns) changed?
- Have inequalities increased?
- Loneliness and isolation?
- Local sustainable economies?
- Working from home and active travel?

Supporting increased physical activity will provide physical, mental and social health benefits

4. COVID Recovery

How can we support people to be more active?

Does it matter what activities people do?

What activities would (do) you recommend to promote well-being?

But how do people view activity?

Sit less, move more

Do we understand peoples' motives for physical activity?

Do we understand peoples' motives for physical activity?


open happiness™
Coca-Cola

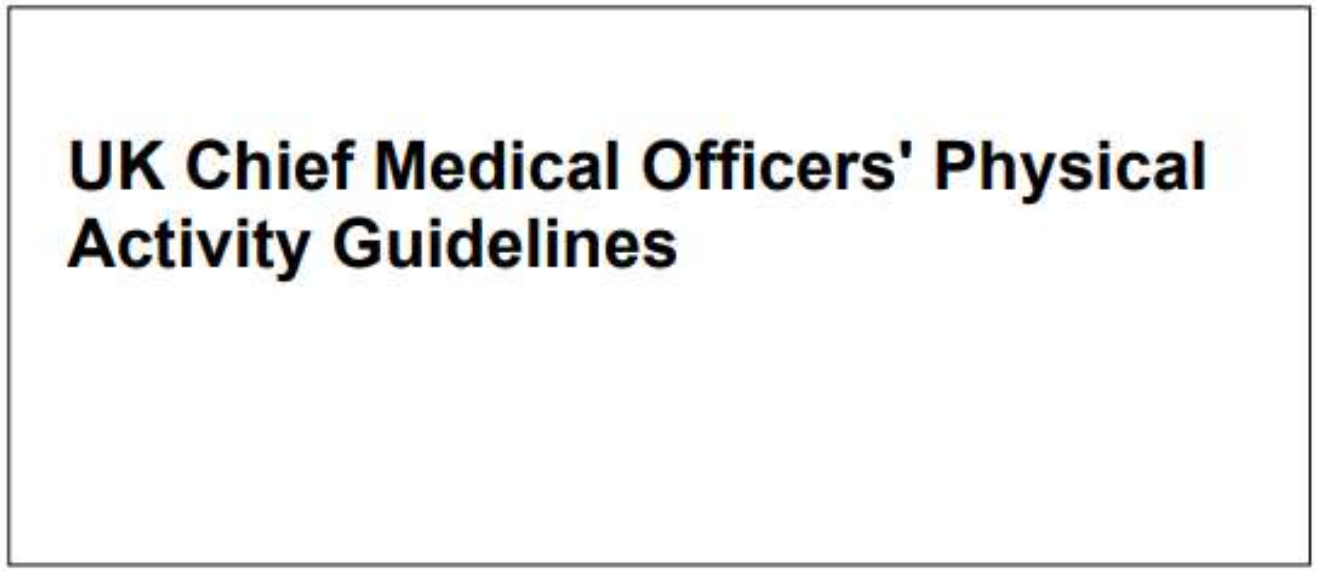
Move for happiness?

Department of Health & Social Care

Llywodraeth Cymru
Welsh Government

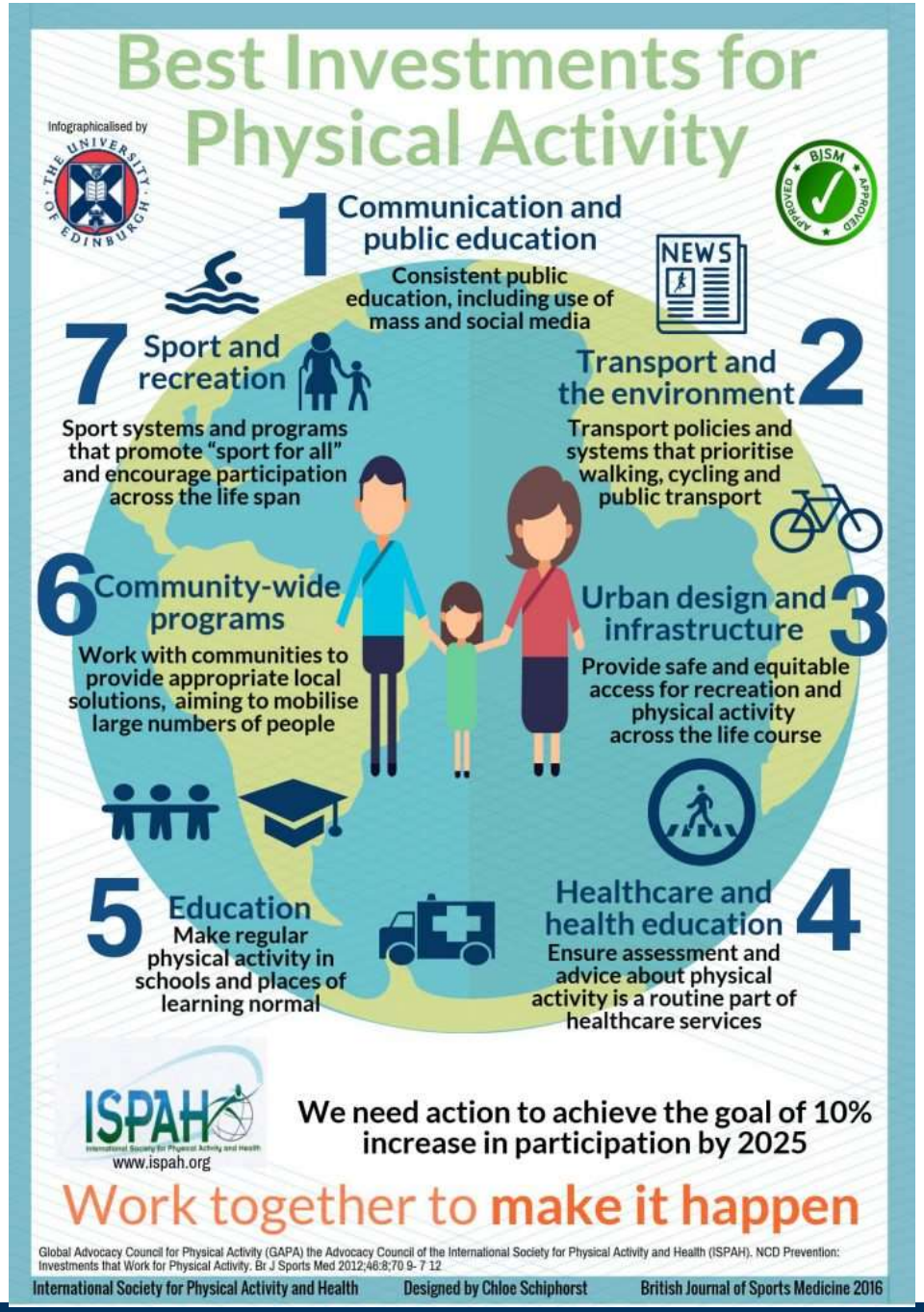
Department of Health
An Roinn Sláinte
Männystrie O Poustie

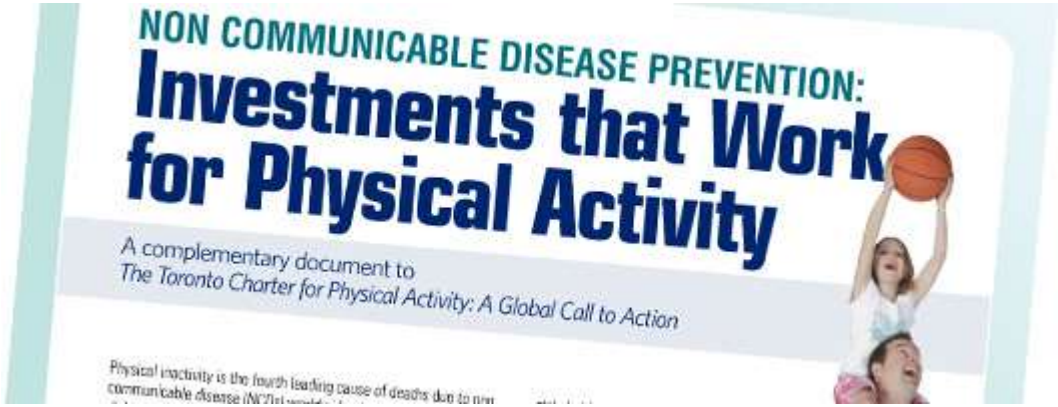
Scottish Government
Riaghaltas na h-Alba
gov.scot



https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf

"Some is good, more is better"

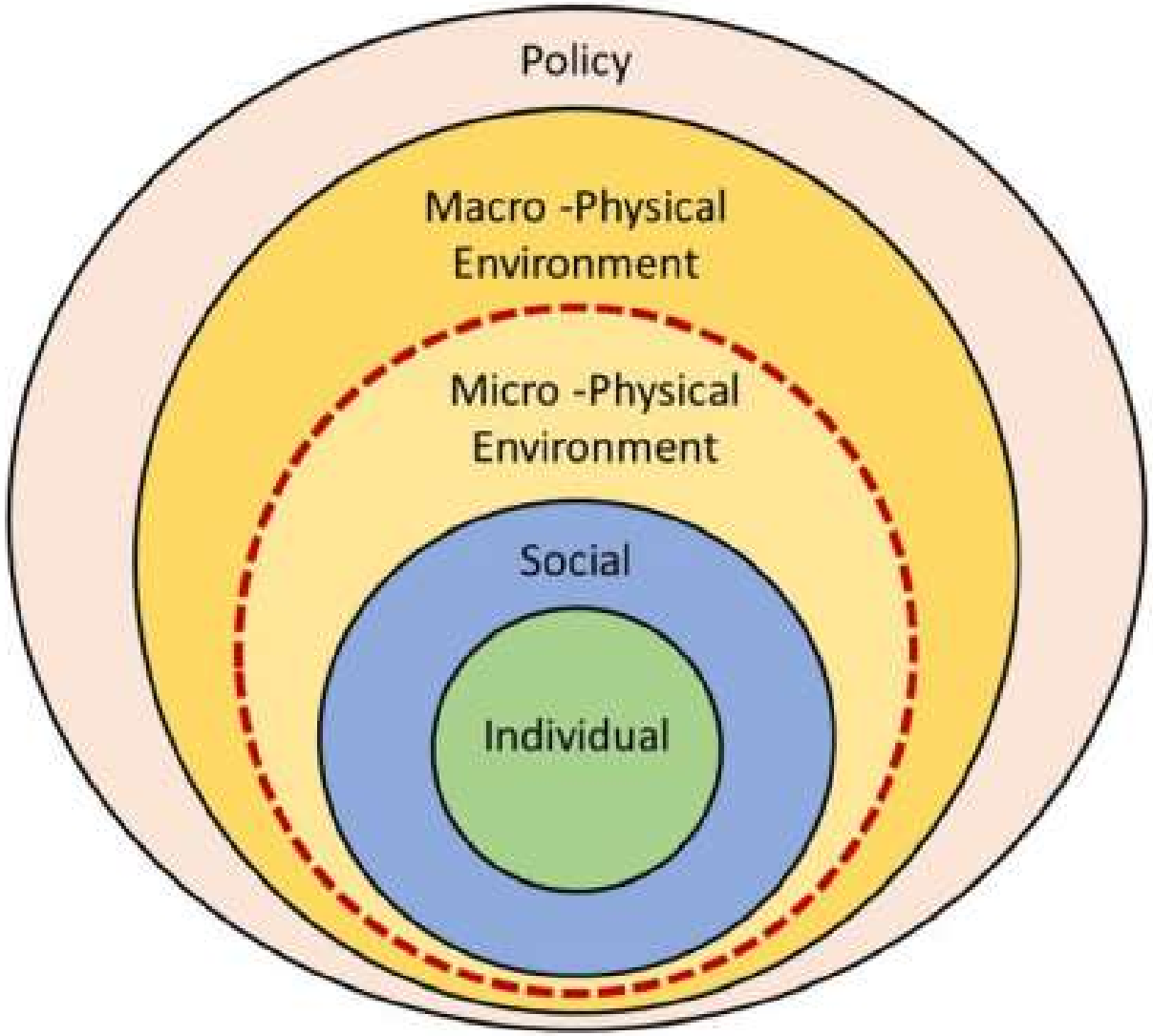




"If these 7 actions are implemented in countries with adequate resources and at a population level they will make a significant contribution to reducing the burden of non-communicable diseases and contribute to improving the quality of life and the environments in which we live"

https://www.globalpa.org.uk/investments/

Twitter: @MovementFHealth



Unlikely to be feasible for groups and organisations

(More) Likely to be feasible for groups and organisations

Adapted from Ecological model (Sallis, 1998)

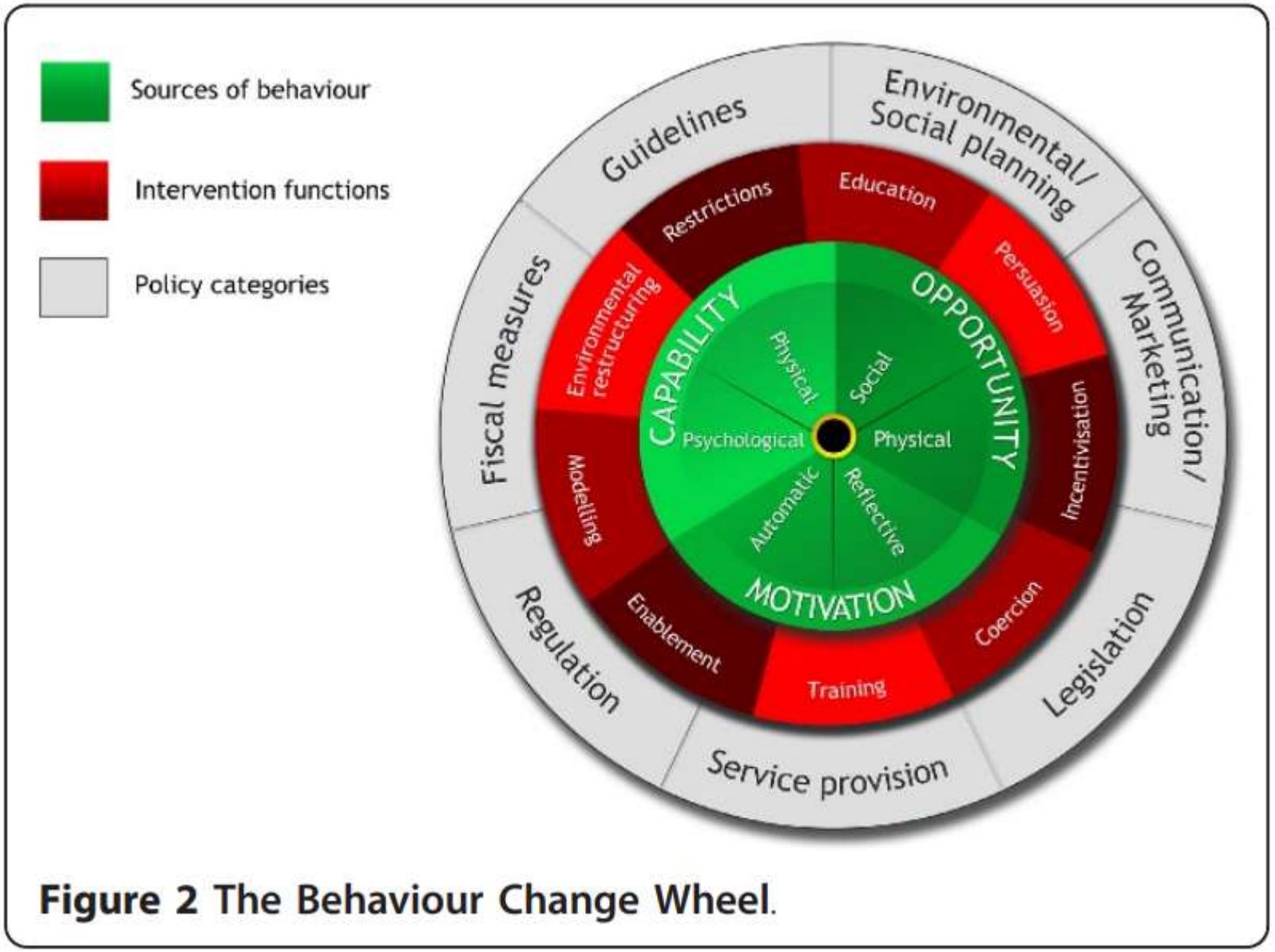


Figure 2 The Behaviour Change Wheel.

Michie et al (2011)

https://implementationscience.biomedcentral.com/track/pdf/10.1186/1748-5908-6-42

Williamson et al. International Journal of Behavioral Nutrition and Physical Activity (2020) 17:51
https://doi.org/10.1186/s12966-020-00954-3

International Journal of Behavioral Nutrition and Physical Activity

REVIEW Open Access

Get the message? A scoping review of physical activity messaging

Chloë Williamson*, Graham Baker, Nanette Mutrie, Ailsa Niven and Paul Kelly

- Messages should highlight short-term or immediate benefits;
- Social and mental health benefits are found to be preferred content;
- Messages should be customised for the recipients (in terms of content and design);
- Messages should use formative research, psychological theory, and/or social marketing theory to inform design and delivery;

https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-00954-3

British Journal of Sports Medicine

Stay calm, be active: simple ways to boost your physical activity during COVID-19

https://blogs.bmj.com/bjsm/2020/03/30/stay-calm-be-active-simple-ways-to-boost-your-physical-activity-during-covid-19/

In Summary…

Physical activity will be crucial to help address the physical, social and mental health impacts of COVID pandemic

Coherent approaches to promote physical activity are required

USHER INSTITUTE COVID-19 WEBINAR

Thanks for listening

p.kelly@ed.ac.uk

@narrowboat_paul

Sept 2020

Are you sitting more due to COVID_19? The benefits of regularly breaking up sitting and top tips to sit less

Dr Claire Fitzsimons

Lecturer in Physical Activity for Health

Sedentary behaviours - any waking behaviour in a sitting, reclining or lying posture with low energy expenditure (≤ 1.5 METs)





Time spent in sedentary behaviours and ***physical*** **health**

↑ **All-cause and cardiovascular disease mortality rates**

↑ **Risk of type 2 diabetes and incident cardiovascular disease**

↑ **Risk of incident endometrial, colon and lung cancer**

↑ **Higher mortality rates from cancer**

↑ **Weight status: higher levels of adiposity and indicators of weight status**

Time spent in sedentary behaviours and ***mental*** **health**

Risk for anxiety

Risk for depression

Risk of sleep disorders

Lower levels of emotional wellbeing

UK Guidelines

- Children/young people and adults should:

“aim to minimise the amount of time spent being sedentary, and when physically possible should break up long periods of inactivity with at least light physical activity”

Don’t sit for long periods

‘The best posture is the next posture’

Top Tips!

- Stand/walk while on the phone
- Stand during video meetings
- Cook from scratch
- Go for a walk or do some stretches
- Water plants
- Get active during commercial breaks when watching TV or between episodes – make a hot drink or tidy the kitchen
- Set a timer or use a fitness tracker to remind you to move

References

- Sedentary Behaviour Research Network Letter to the Editor: Standardized use of the terms “sedentary” and “sedentary behaviours” Appl. Physiol. Nutr. Metab. 2012;37:540–542.
- US 2018 Physical Activity Guidelines Advisory Committee Scientific Report. Washington, DC: U.S Department of Health and Human Services. 2018
- Paterson, R et al., Sedentary behaviour and risk of all-cause cardiovascular and cancer mortality, and incident type 2 diabetes: a systematic review and dose response meta-analysis. Eur J Epidemiol, 33(9), 2018.
- Teychenne M., Costigan S.A., Parker K. The association between sedentary behaviour and risk of anxiety: a systematic review. BMC Public Health. 2015;15:513
- Teychenne M., Ball K., Salmon J. Sedentary behavior and depression among adults: a review. Int. J. Behav. Med. 2010;17:246–254.
- Atkin A.J., Adams E., Bull F.C., Biddle S.J.H. Non-occupational sitting and mental well-being in employed adults. Ann. Behav. Med. 2012;43:181–188.
- Endrighi R., Steptoe A., Hamer M. The effect of experimentally induced sedentariness mood and psychobiological responses to mental stress. Br. J. Psychiatry J. Ment. Sci. 2
- Department of Health. UK Chief Medical Officers’ Physical Activity Guidelines. 2019.