# Bupa Sustainable Supply Chain Summit 2025

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Intelligent Health

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# Human and Planet sickness: What's the link?

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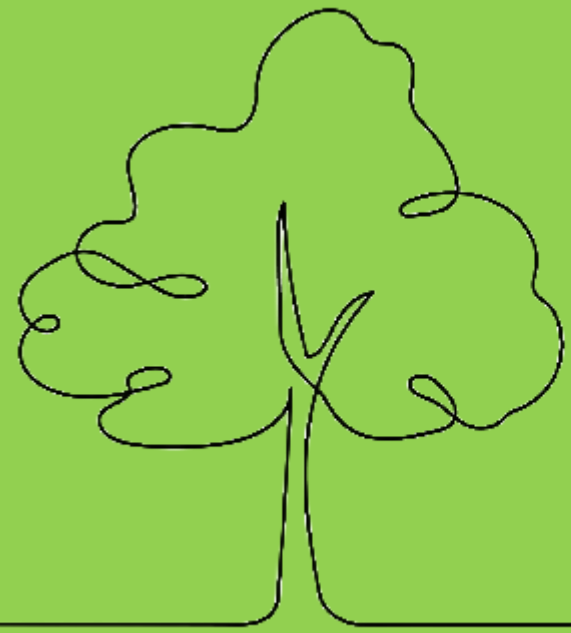
Ecosystem (Nature)



Ecosystem

(Human)

Gut, brain, skin

Biome

# Feeling Safe

Psychological safety is recognised as central to mental health, wellbeing (Sullivan et al, 2018) and post-traumatic growth (Norman et al, 2020)

# Feeling Valued

Flett, G.L. and Heisel, M.J., 2021. Aging and feeling valued versus expendable during the COVID-19 pandemic and beyond: a review and commentary of why mattering is fundamental to the health and well-being. *International Journal of Mental Health and Addiction*, *19*(6), pp.2443-2469.

# Sense of belonging

Trachtenberg, E., 2024. The beneficial effects of social support and prosocial behavior on immunity and health: A psychoneuroimmunology perspective. Brain, Behavior, & Immunity-Health, p.100758.

# There are three domains that affect our sense of feeling safe, value and belonging.

## People

## Place

## Purpose

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# The Health Creation Matrix©

| | People | Purpose | Place |
|---|---|---|---|
| Safe | Trust | Autonomy hope | Secure |
| Valued | Respect | Fulfillment | Resonance |
| Belong | Community | Values | Home |

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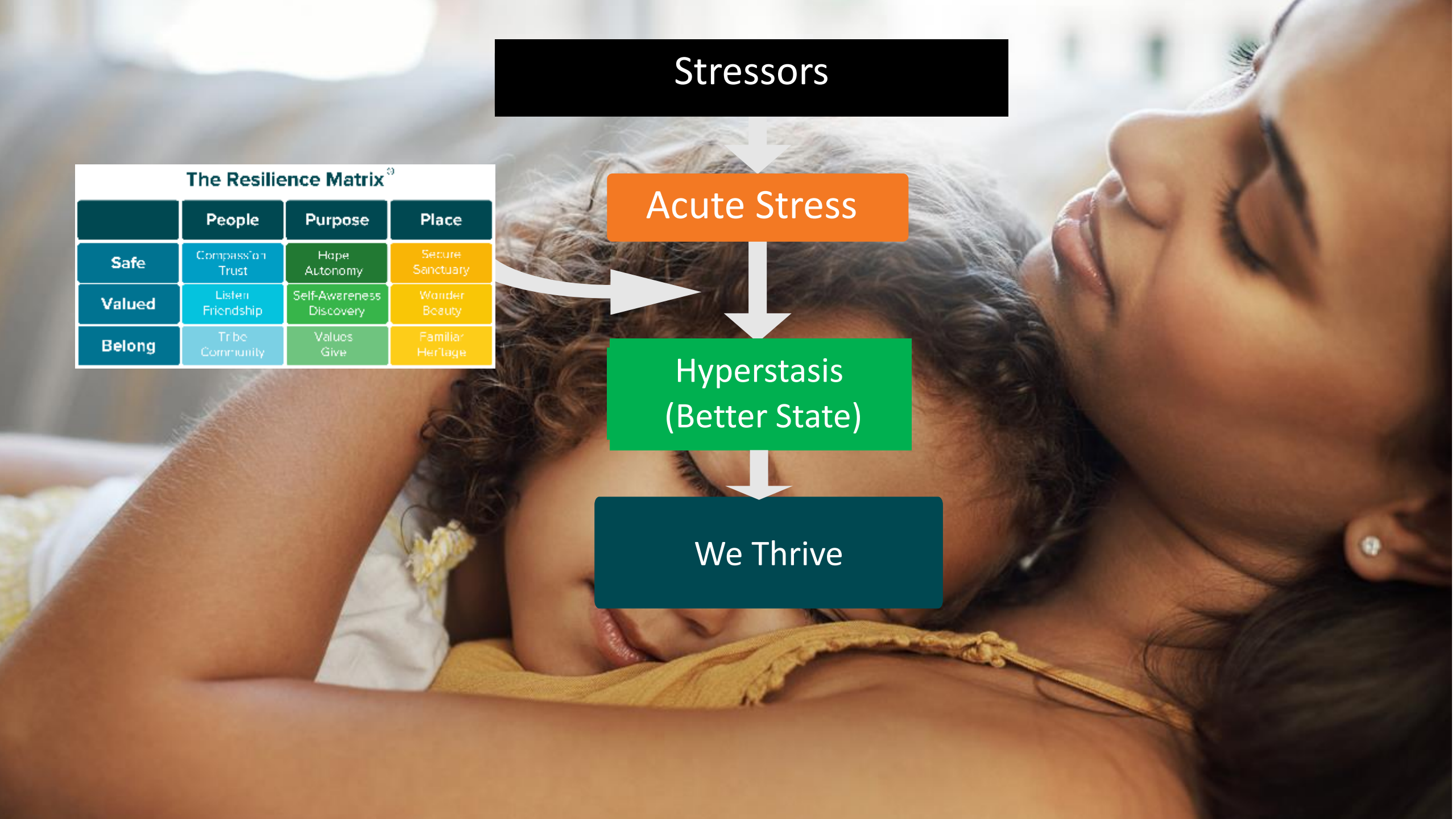
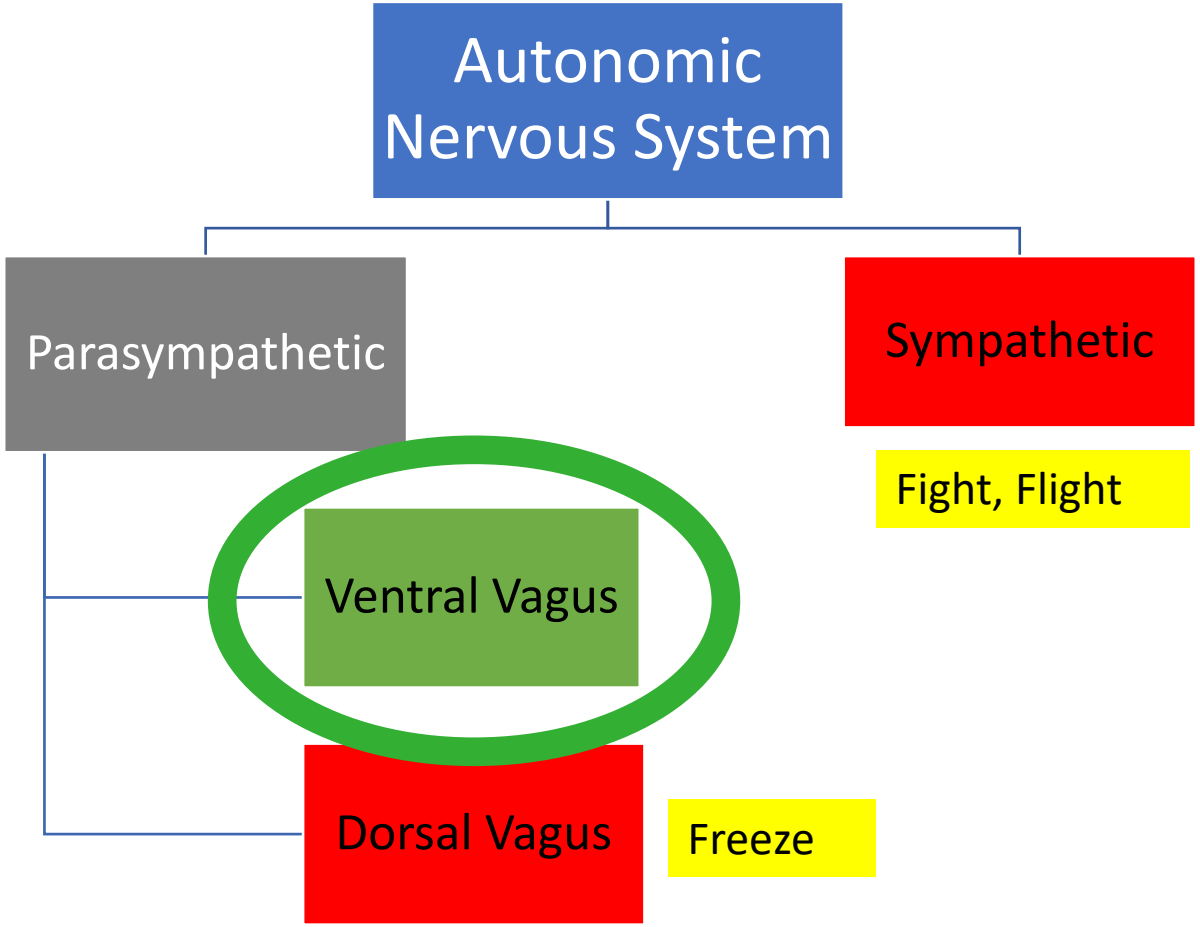



**The Resilience Matrix**©

| | People | Purpose | Place |
|---|---|---|---|
| **Safe** | Compassion Trust | Hope Autonomy | Secure Sanctuary |
| **Valued** | Listen Friendship | Self-Awareness Discovery | Wonder Beauty |
| **Belong** | Tribe Community | Values Give | Familiar Heritage |

# Autonomic Nervous System

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# Ventral Vagus Nerve Social Engagement System

Stressors

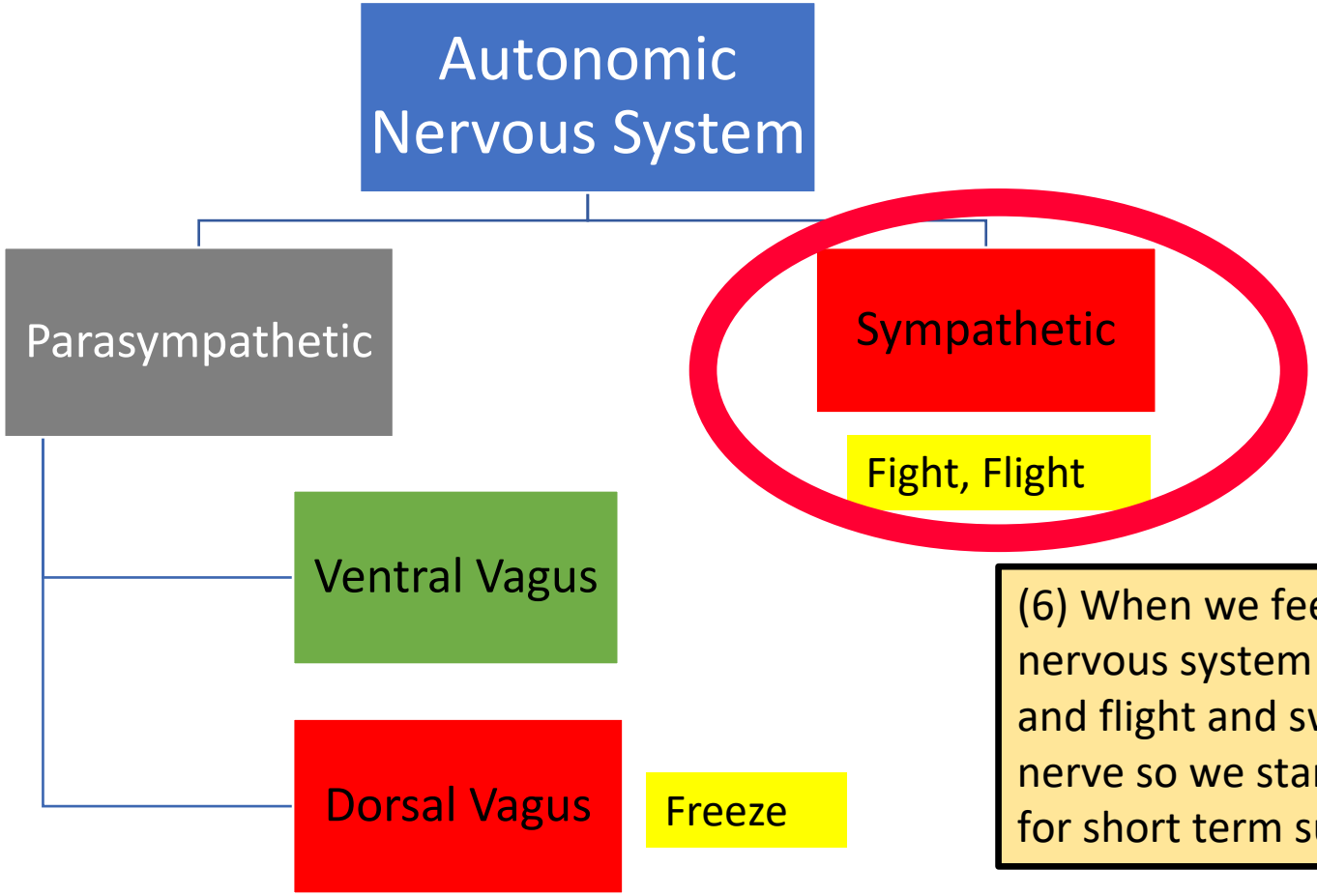
Weak Resilience → Acute Stress → Chronic Stress,

The Resilience Matrix

| | People | Purpose | Place |
|---|---|---|---|
| Safe | Compassion | Economy | Secure Sanctuary |
| Valued | Friendship | Self-Awareness | Wonder Beauty |
| Belong | Tribe Community | Values Give | Familiar |

Hyperstasis (Better State)

# Autonomic Nervous System




(6) When we feel threatened the Sympathetic nervous system is activated. This is about fight and flight and switches off the ventral vagus nerve so we start to sacrifice long term health for short term survival

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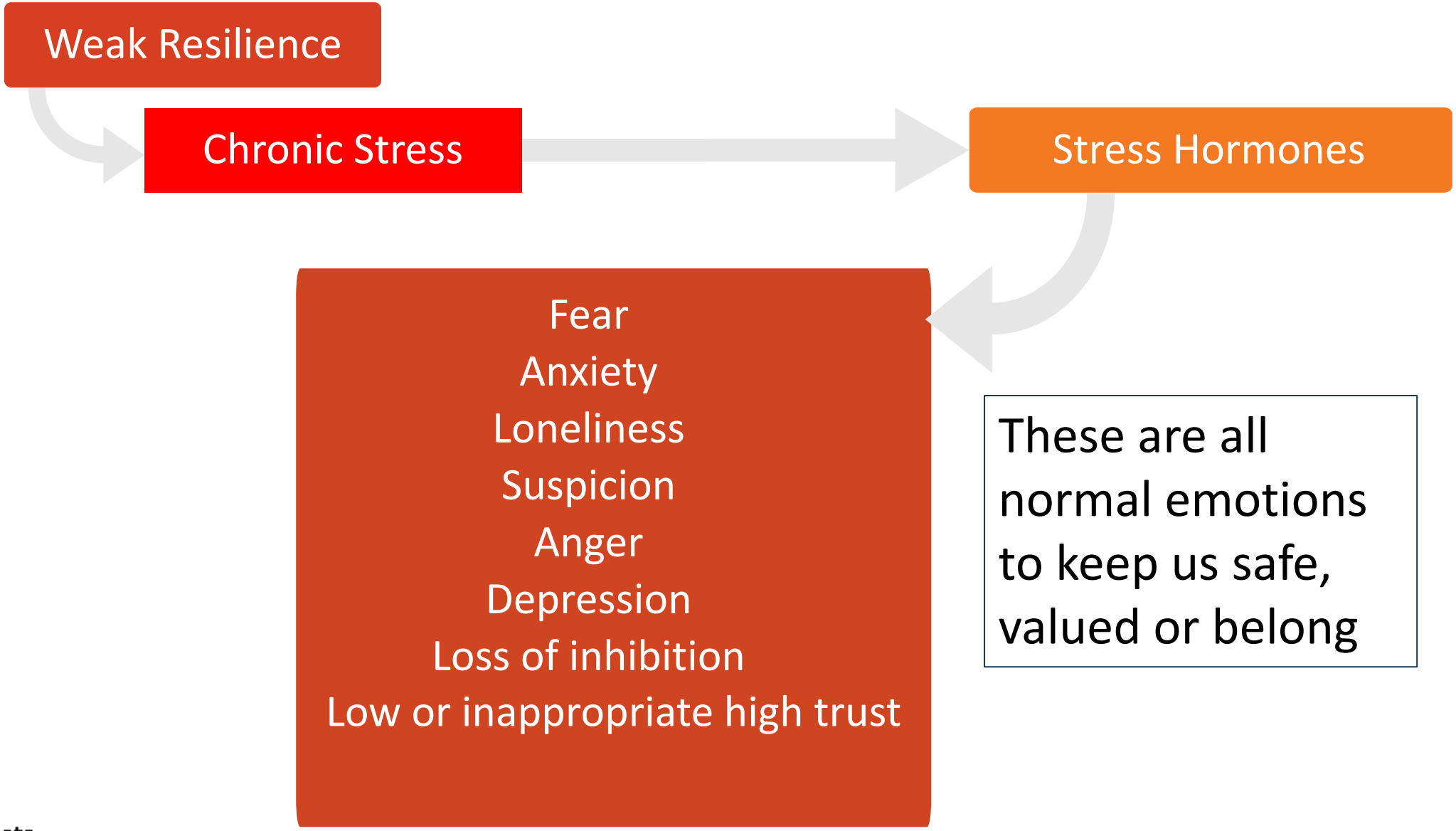
# Sympathetic Nervous System Fight and Fight

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Weak Resilience

Chronic Stress

Stress Hormones

Negative Emotions

Unhealthy Behaviours

Poor Sleep
Inactivity
Poor diet
Addictions

All these “unhealthy” lifestyles are protective when under stress

Weak Resilience

Chronic Stress

Stress Hormones

Negative Emotions

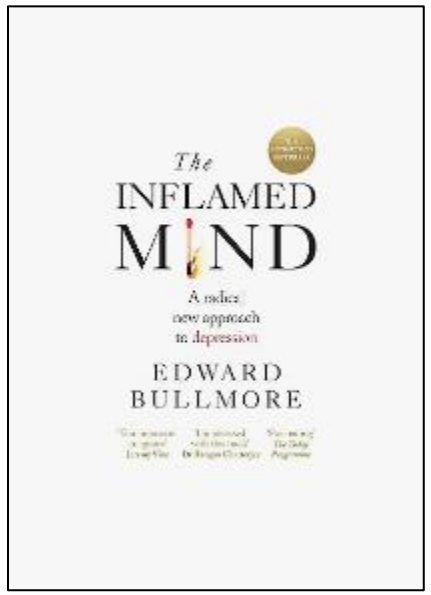
Unhealthy Behaviours

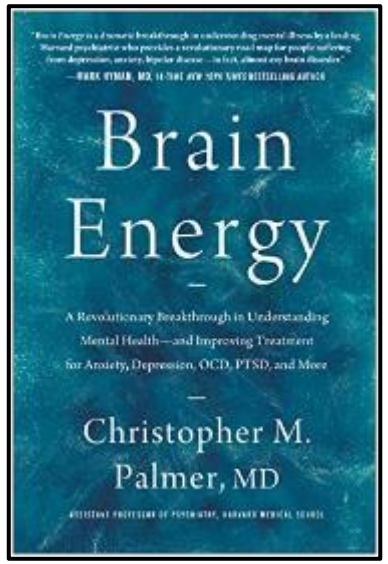
Environmental Toxins

Obesity Gut Biome

Chronic Inflammation

Mitochondrial Dysfunction

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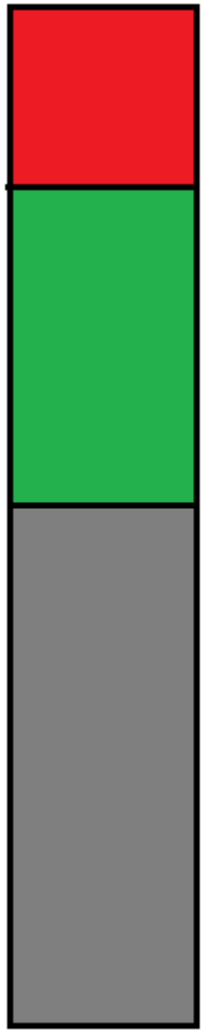
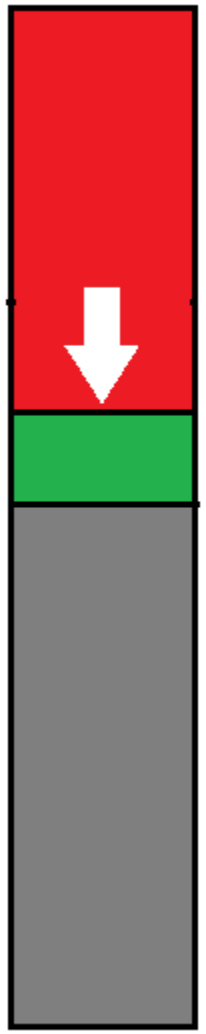
# Chronic Stress



Stress

Growth
Maintenance and
Repair

Vital



Picard, M., Kempes, C., Pontzer, H., Behnke, A. and Shaulson, E.D., 2025. Energy Constraints on Human Health.

Increased Chronic Stress uses up additional energy and takes it from Growth Maintenance and Repair. Cells become less efficient and demand more energy.
Chronic Inflammation uses up further energy

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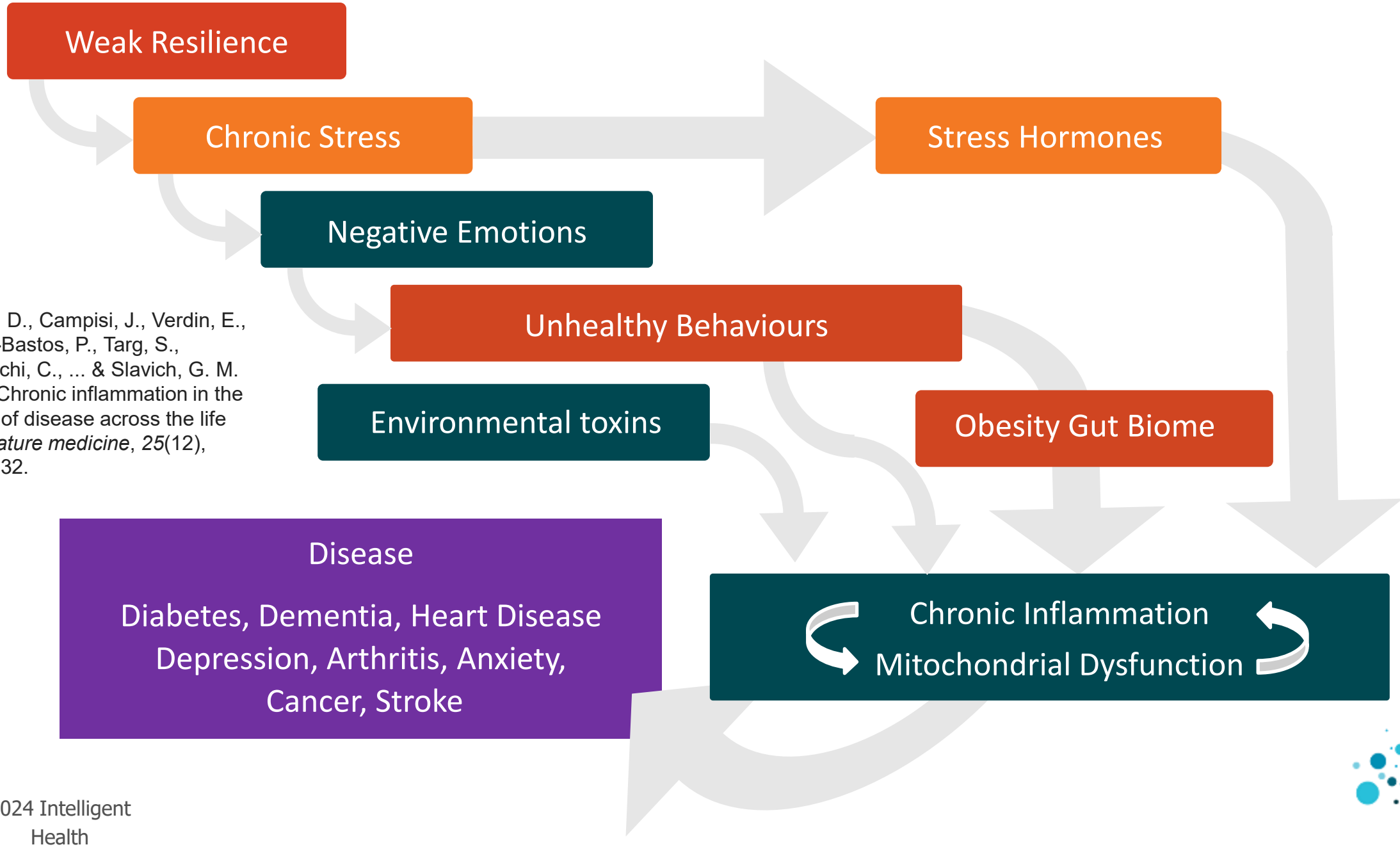


Furman, D., Campisi, J., Verdin, E., Carrera-Bastos, P., Targ, S., Franceschi, C., ... & Slavich, G. M. (2019). Chronic inflammation in the etiology of disease across the life span. *Nature medicine*, *25*(12), 1822-1832.

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# HCI adult factors

The statements that respondents are asked to rate

| | People | Purpose | Place |
|---|---|---|---|
| **Safe** | Most people are trustworthy | I feel in control of my life<br>I've been feeling optimistic about my future | Overall, I think my neighbourhood is a good place to bring up children |
| **Valued** | The friendships and connections I have with other people mean a lot to me | I lead a fulfilling life | I enjoy exploring my neighbourhood |
| **Belong** | There is a group or community which I feel I belong to | I like sharing my time with others | I want to remain a resident of this neighbourhood for a number of years |

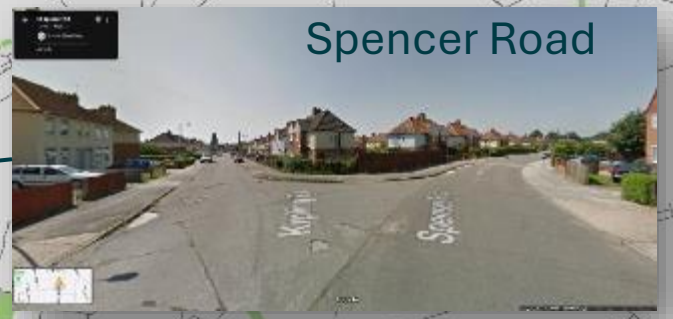
Respondents are asked the extent to which they agree with each statement:
Strongly Disagree, Disagree, Neither Agree no Disagree, Agree, Strongly Agree

Insights

# Ipswich - Granular Evidence supporting targeted effort

## Ipswich Players Home Location: Low Health Creation, Physically Inactive, and Low Nature Connection

The insight can be used at street/neighbourhood level to understand the intersecting risk factors. Helping evidence need and build on strengths.



Whitton
Whitehouse
Castle Hill
St Margaret's
Rushmere
Westgate
Alexandra
St John's
Bixley
Gipping
Holywells
Sprites
Bridge
Stoke Park
Gainsborough
Priory Heath

Key

Beat Box Location

Higher density

Lower density

334 players

Insights

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# HCI
## Diabetes

## Aged 50+

Insights

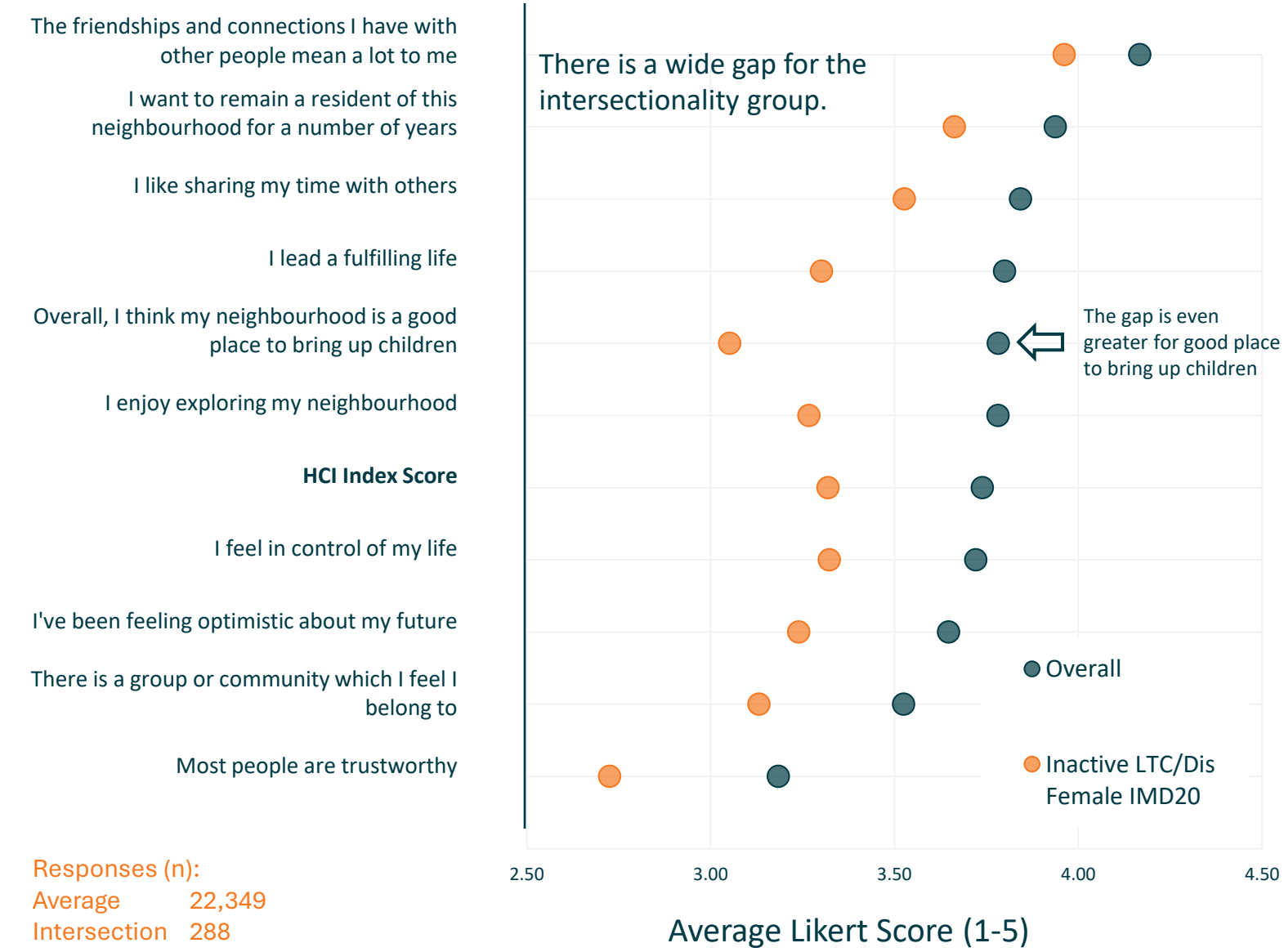
HCI

# Intersectionality

The group represents people who are all of these;

- Female
- Long-term limiting Health condition or Disability
- Living in the most deprived quintile.

#Walk21Tirana
#Time4Walking




Responses (n):

| | |
|---|---|
| Average | 22,349 |
| Intersection | 288 |

Insights

# HCI
## Mental Health

Insights

## Health Creation

Safe, Value, Belong

Poor Health Creation leads to Chronic Stress

## Lifestyle Prevention

Sleep, Physical Activity, Diet Smoking Alcohol

## Medical Prevention

Obesity, Hypertension, Gut Biome

Chronic Stress leads to Chronic Inflammation

## Treatment

Diabetes, Depression, Dementia, Heart disease, Inflammatory Bowel Disease, COPD, Anxiety.

Chronic Inflammation leads to these Diseases

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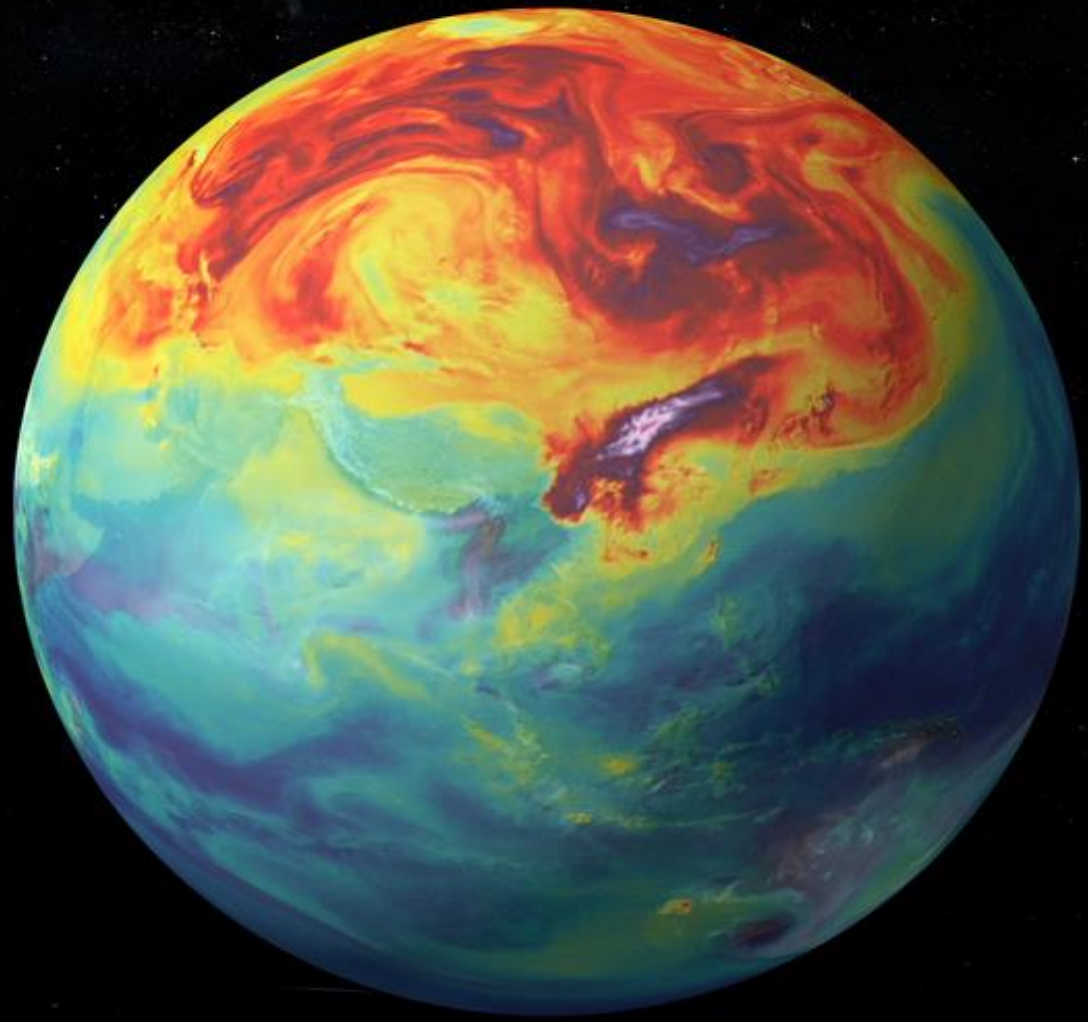
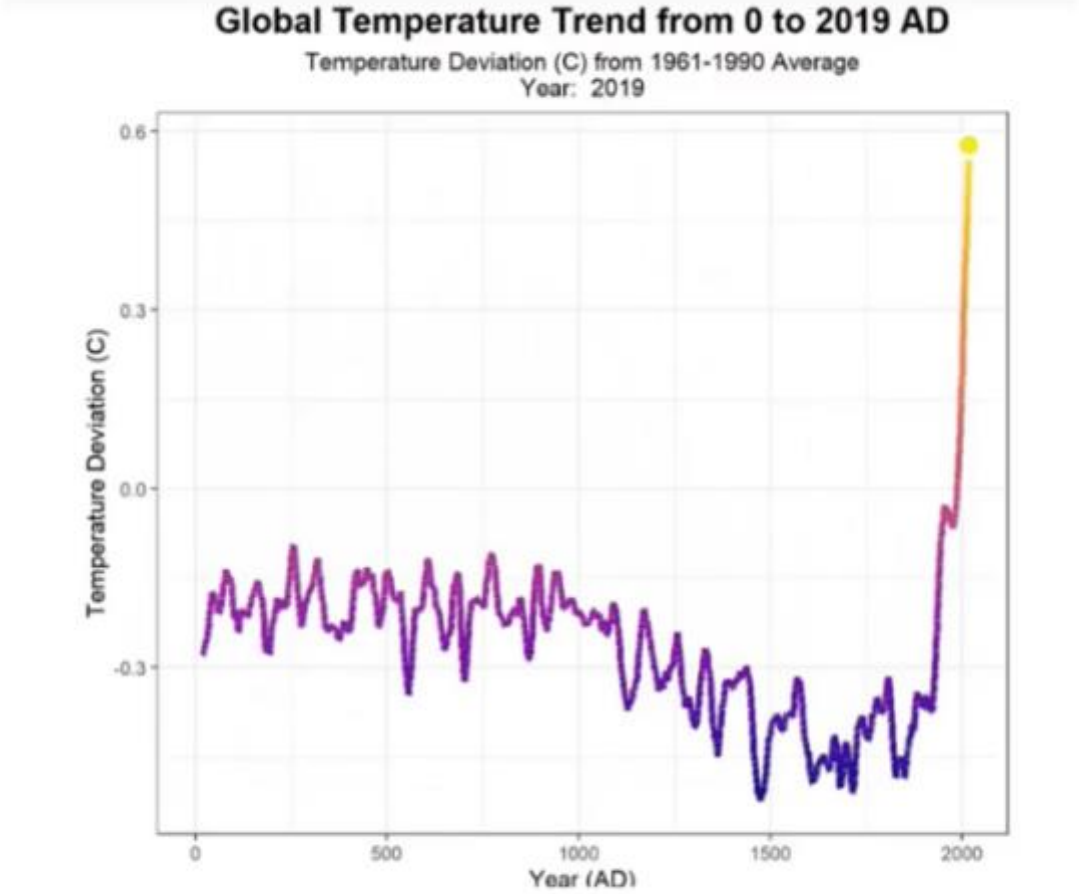
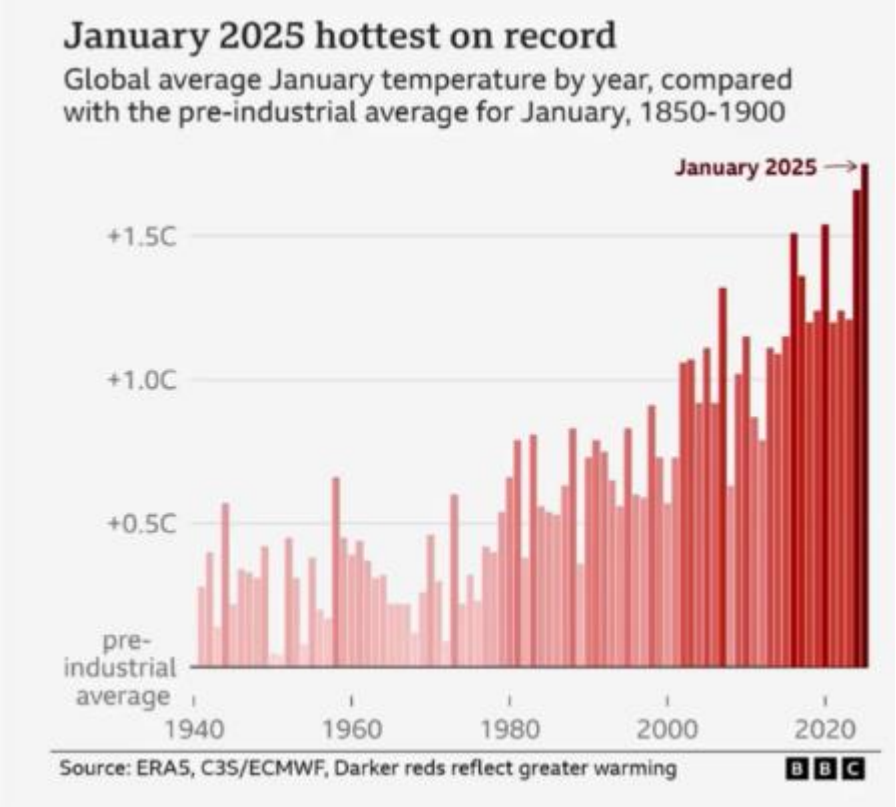


As our Planet Heats
our environment is
becoming less safe

# 2024 was hottest since125,000 years ago

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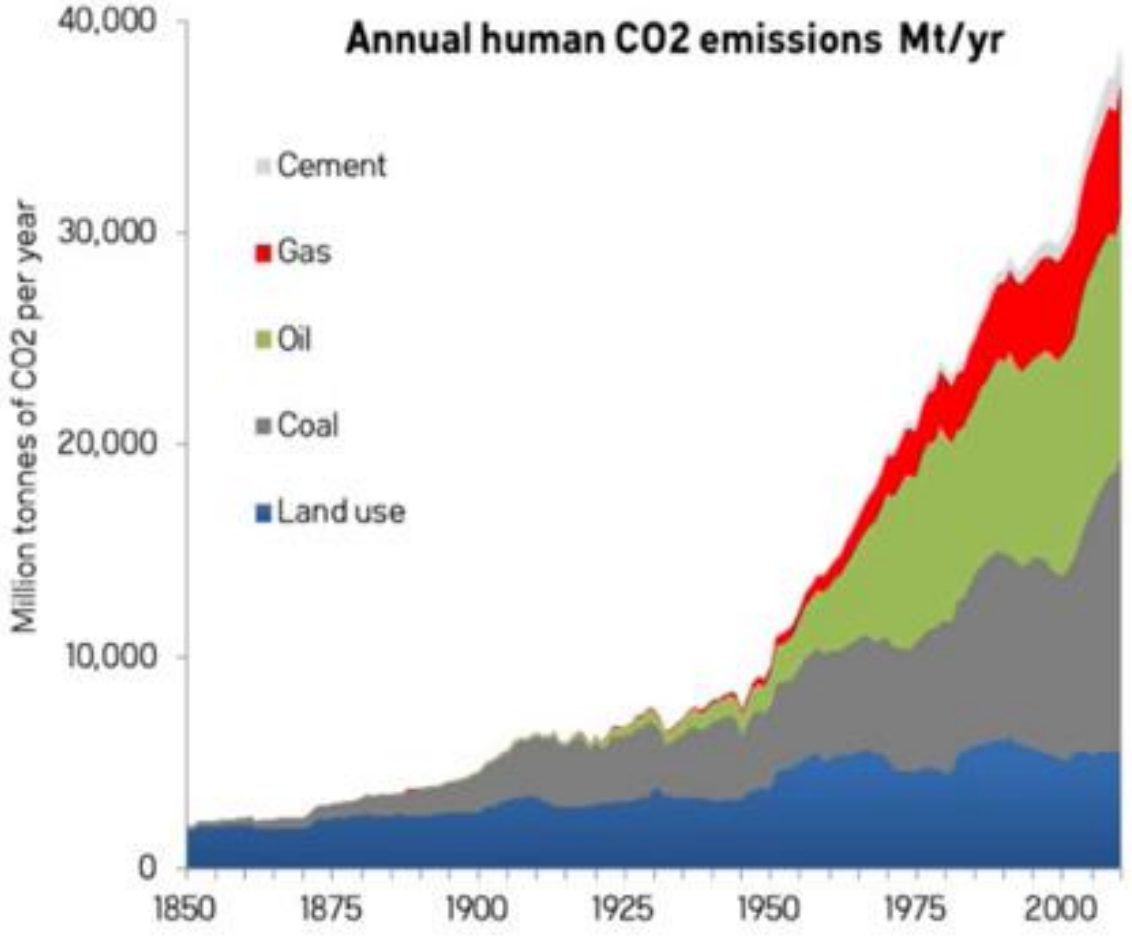
# CO2 emissions continue to climb

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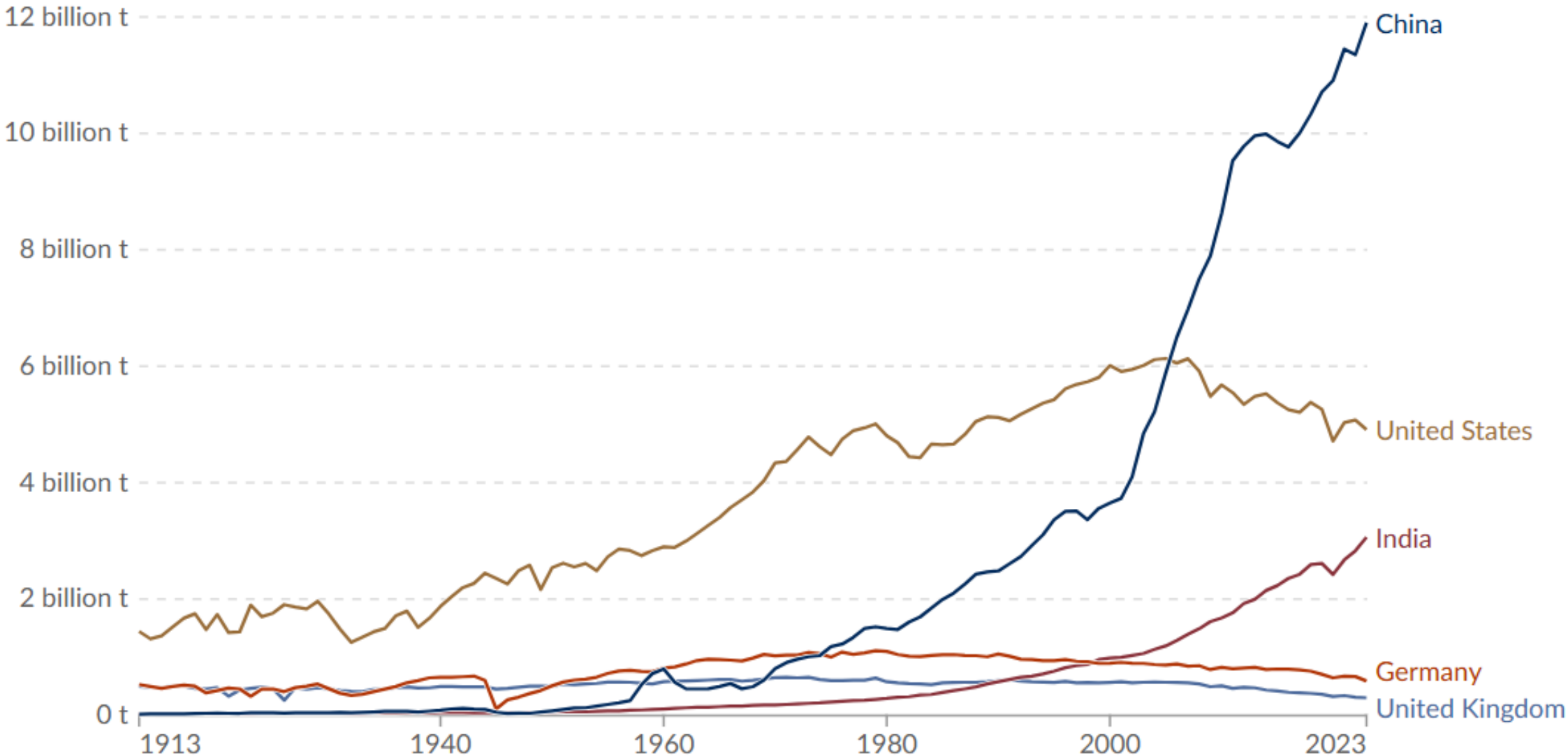
# Annual $CO_2$ emissions

Carbon dioxide ($CO_2$) emissions from fossil fuels and industry. Land-use change is not included.

Our World in Data



# CO2 per Capit

## Territorial Per capita ($tCO_2$/person)

| Rank | Country | $tCO_2$/person |
|---|---|---|
| 1 | Qatar | 43 |
| 2 | Australia | 15 |
| 3 | United States of America | 14 |
| 4 | Canada | 14 |
| 5 | Russian Federation | 13 |
| 6 | China | 8.3 |
| 7 | Germany | 7.2 |
| 8 | United Kingdom | 4.5 |
| 9 | France | 4.2 |
| 10 | India | 2.1 |

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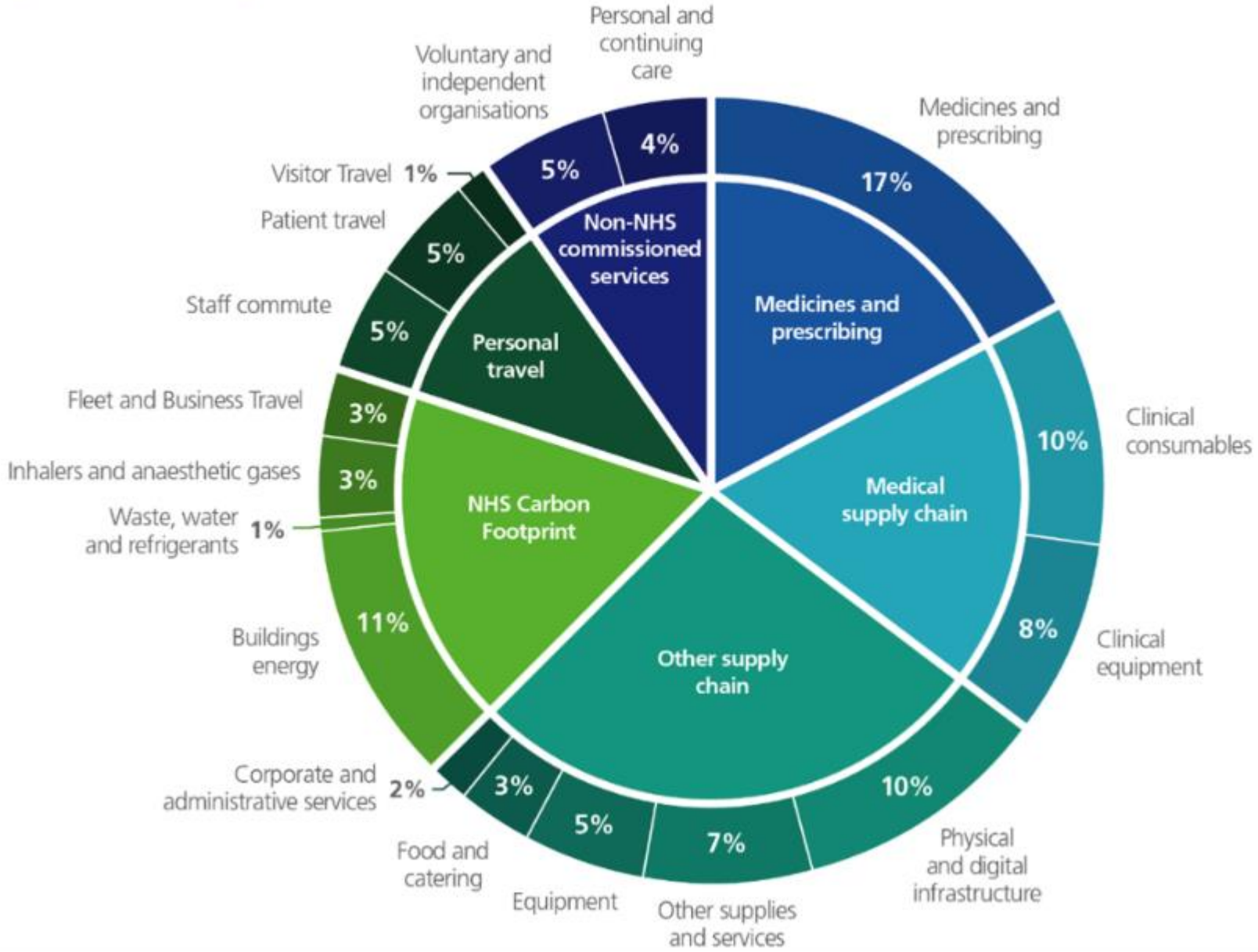
Figure 1: a breakdown of emissions by proportion of the NHS Carbon Footprint Plus, represented as a pie chart

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# Disconnect from Nature

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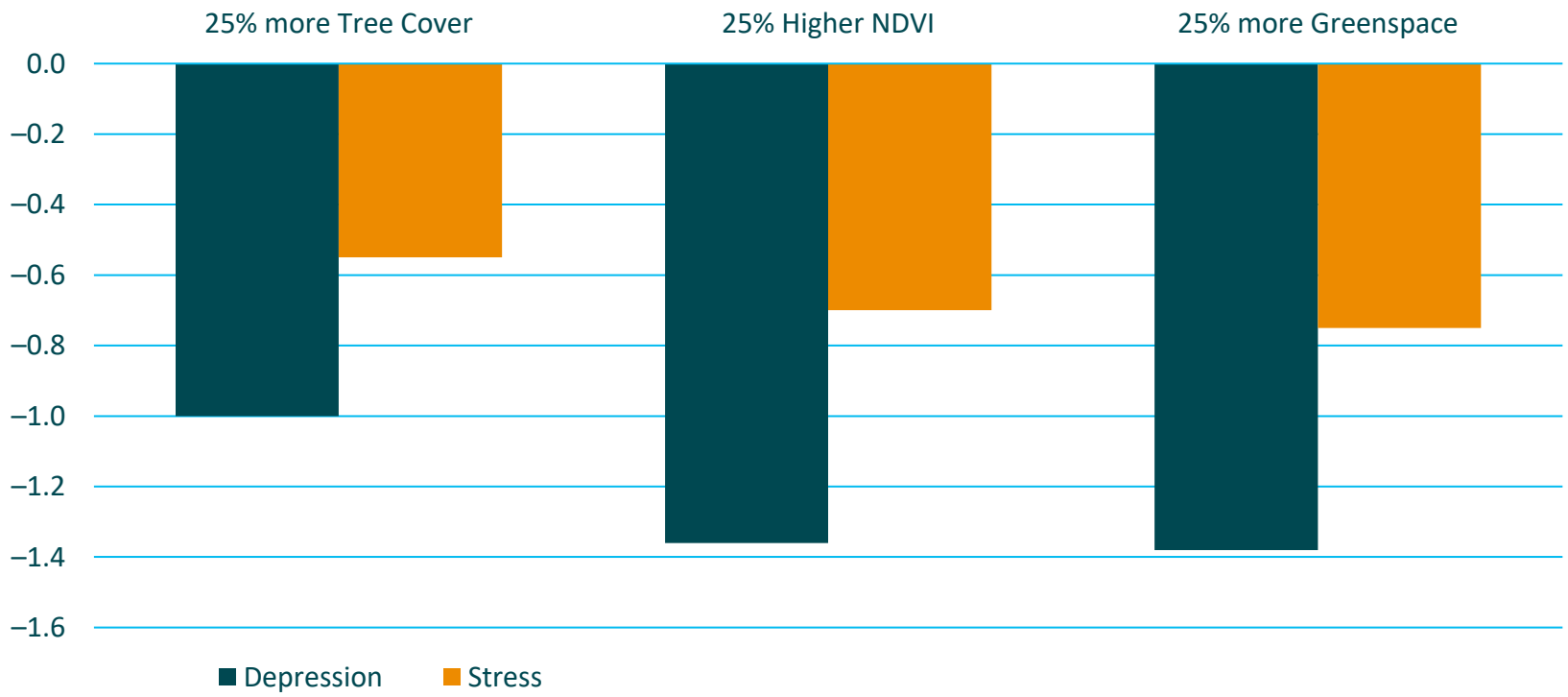
# Association Between Trees, Vegetation, Depression and Stress

Normalized Difference Vegetation Index (NDVI)




Mitchell, R. and Popham, F. (2008) Effect of exposure to natural environment on health inequalities: an observational population study. The Lancet 372(9650):pp. 1655-1660.

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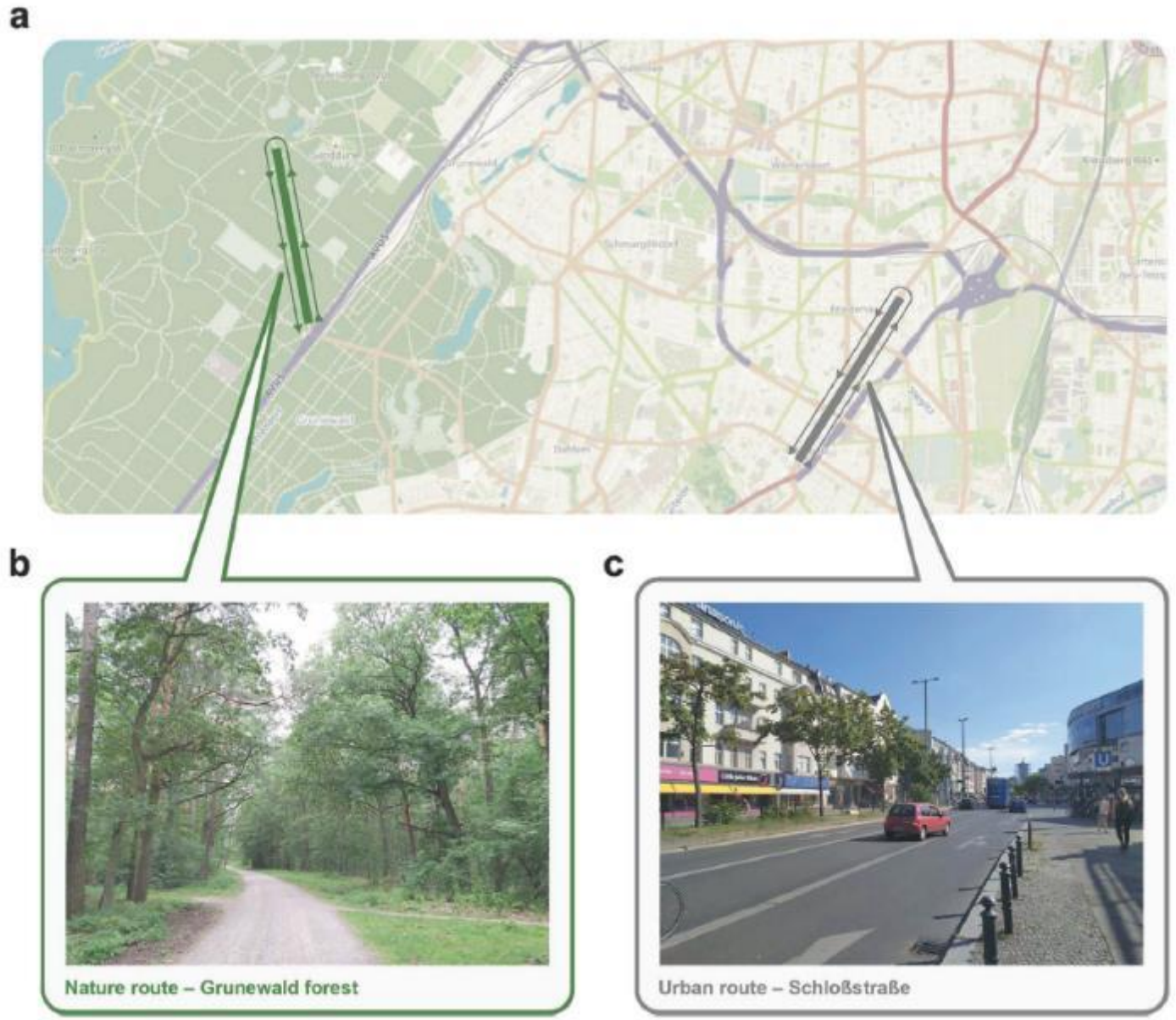
# How a short walk in Nature can change your brain structure

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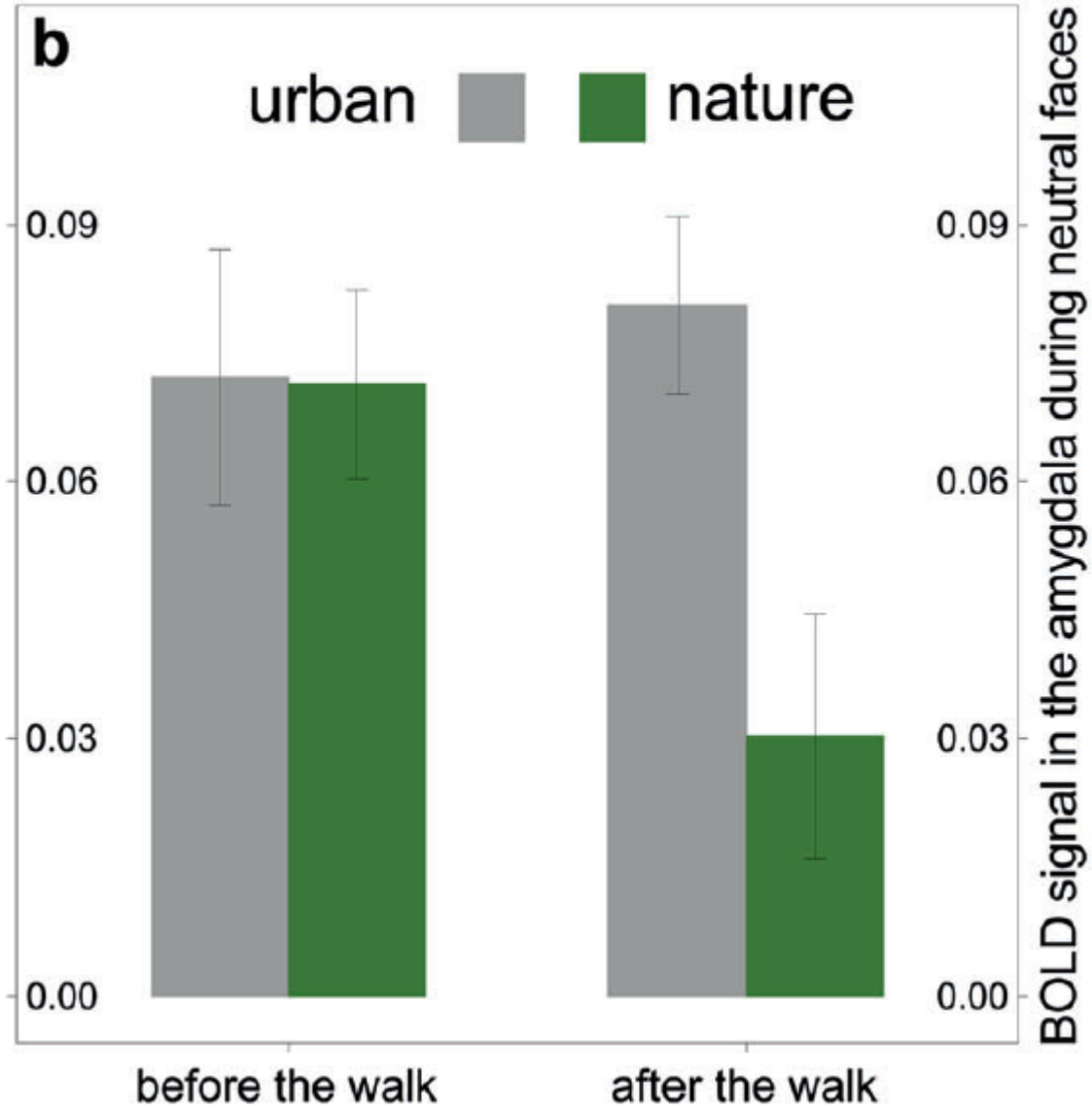
# Amygdala changes after 60 min walk




Sudimac, S., Sale, V. and Kühn, S., 2022. How nature nurtures: Amygdala activity decreases as the result of a one-hour walk in nature. Molecular psychiatry, 27(11), pp.4446-4452.

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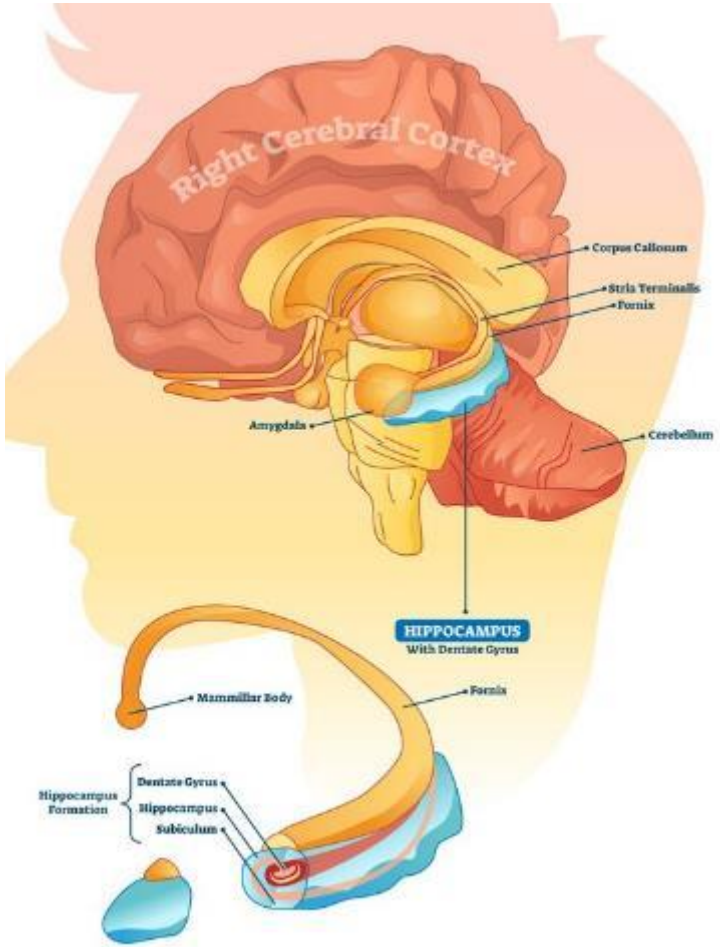
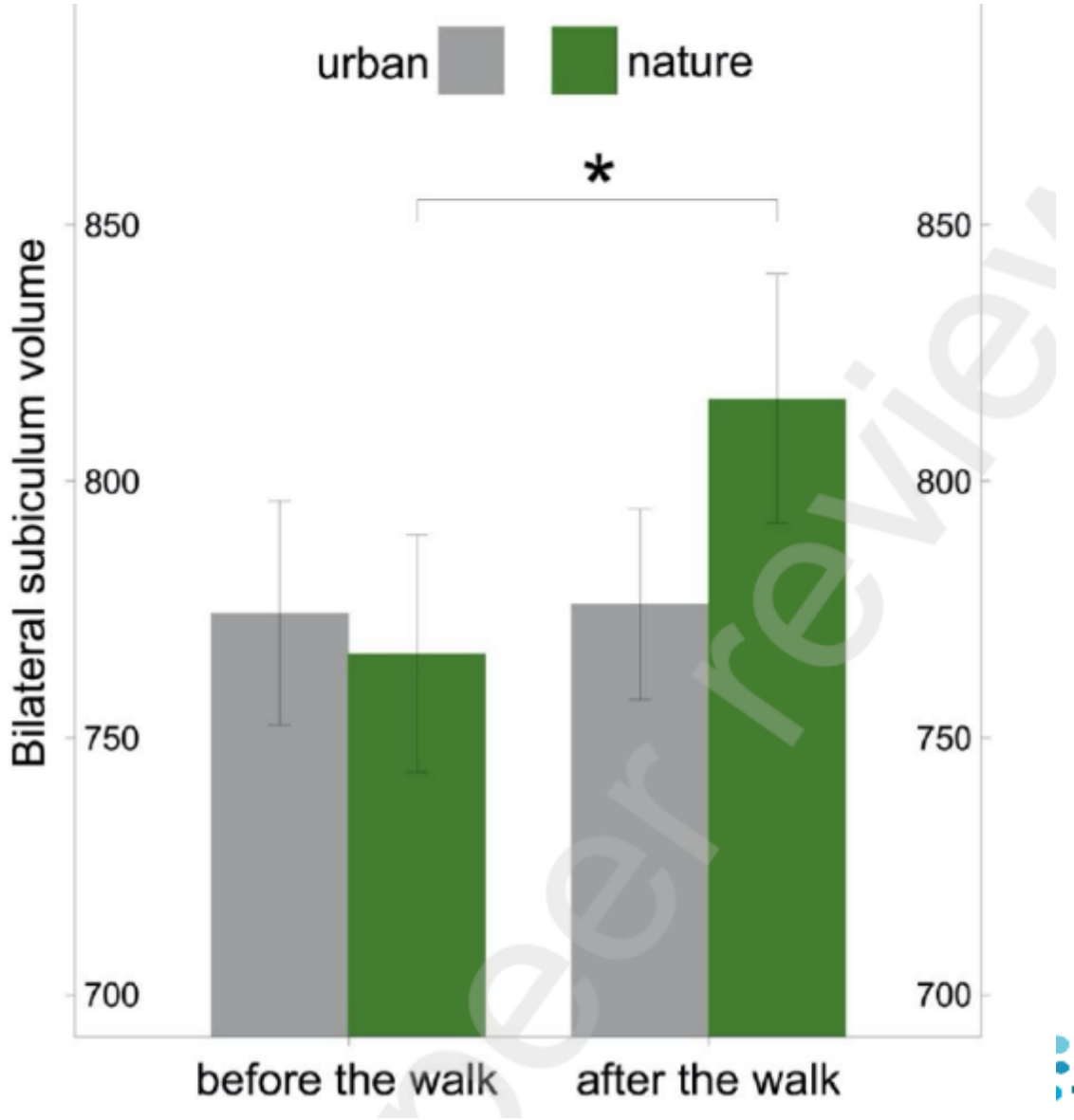
# Hippocampus changes after 60 min walk

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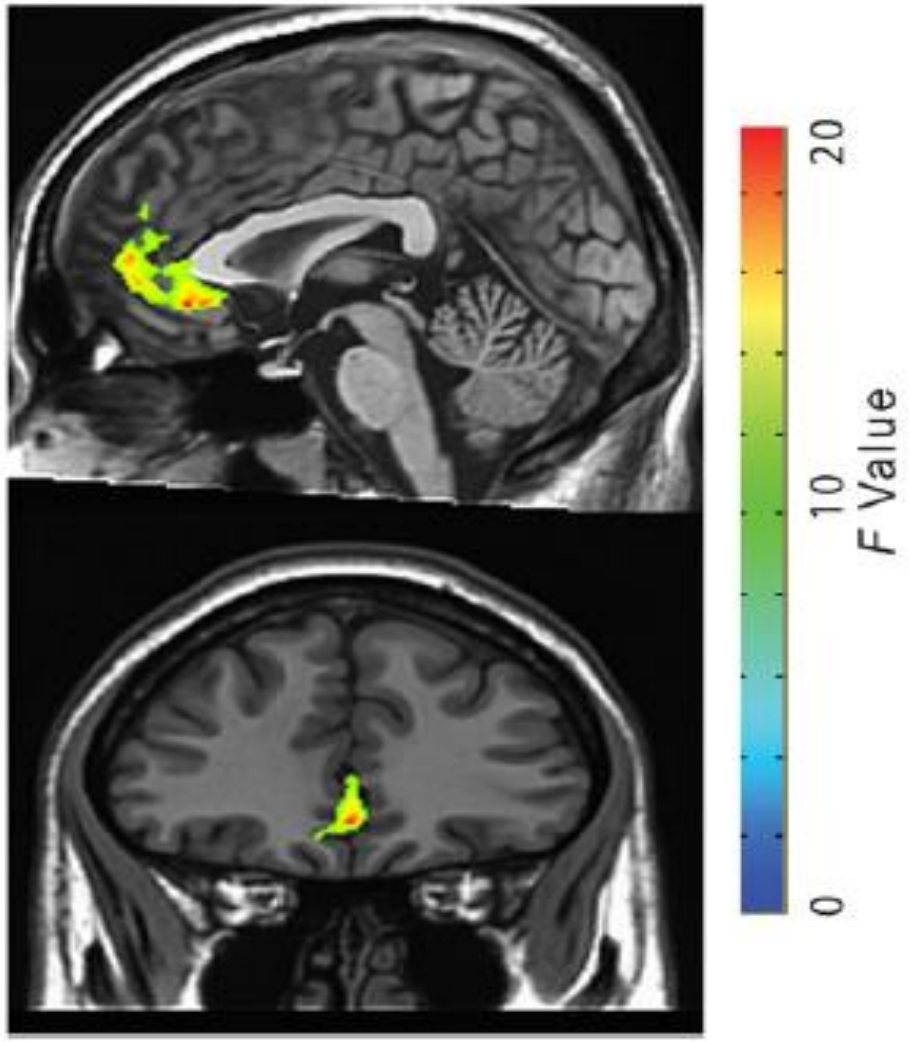
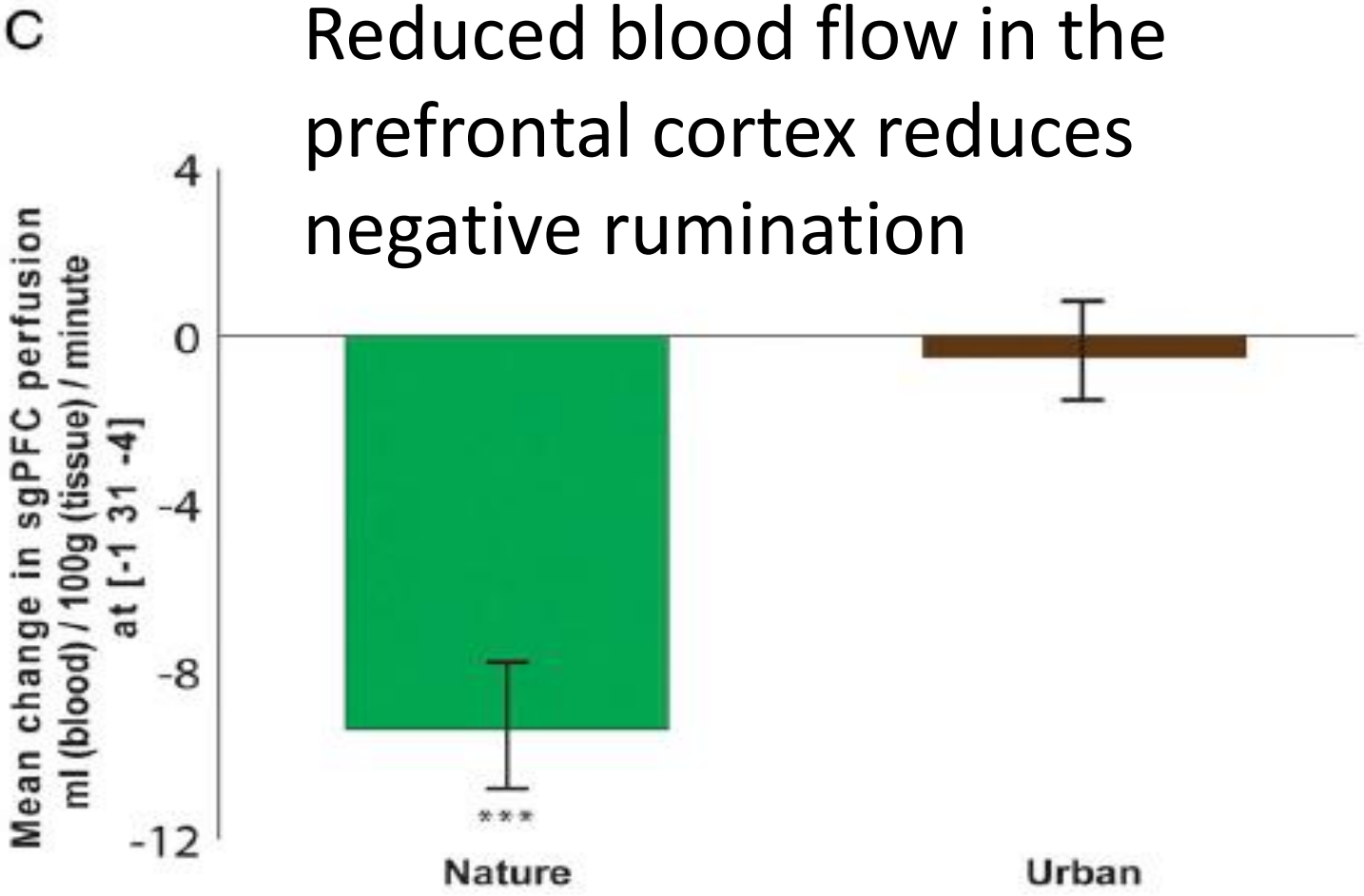
# Reduced blood flow in the prefrontal cortex reduces negative rumination




Bratman et al. 2015. **Nature experience reduces rumination and subgenual prefrontal cortex activation.** *PNAS. 112(28):8567-8572*

# Start Well

High Blood Pressure in pregnant women increased by 14% for every 300 meters away from green space

Birth weight was healthier within the 500 metres of green space

1. Grazuleviciene R et al Int J Environ Res Public Health 2014 11 2958-2972
2. Dadvand P Env Health Perspectives 120 10

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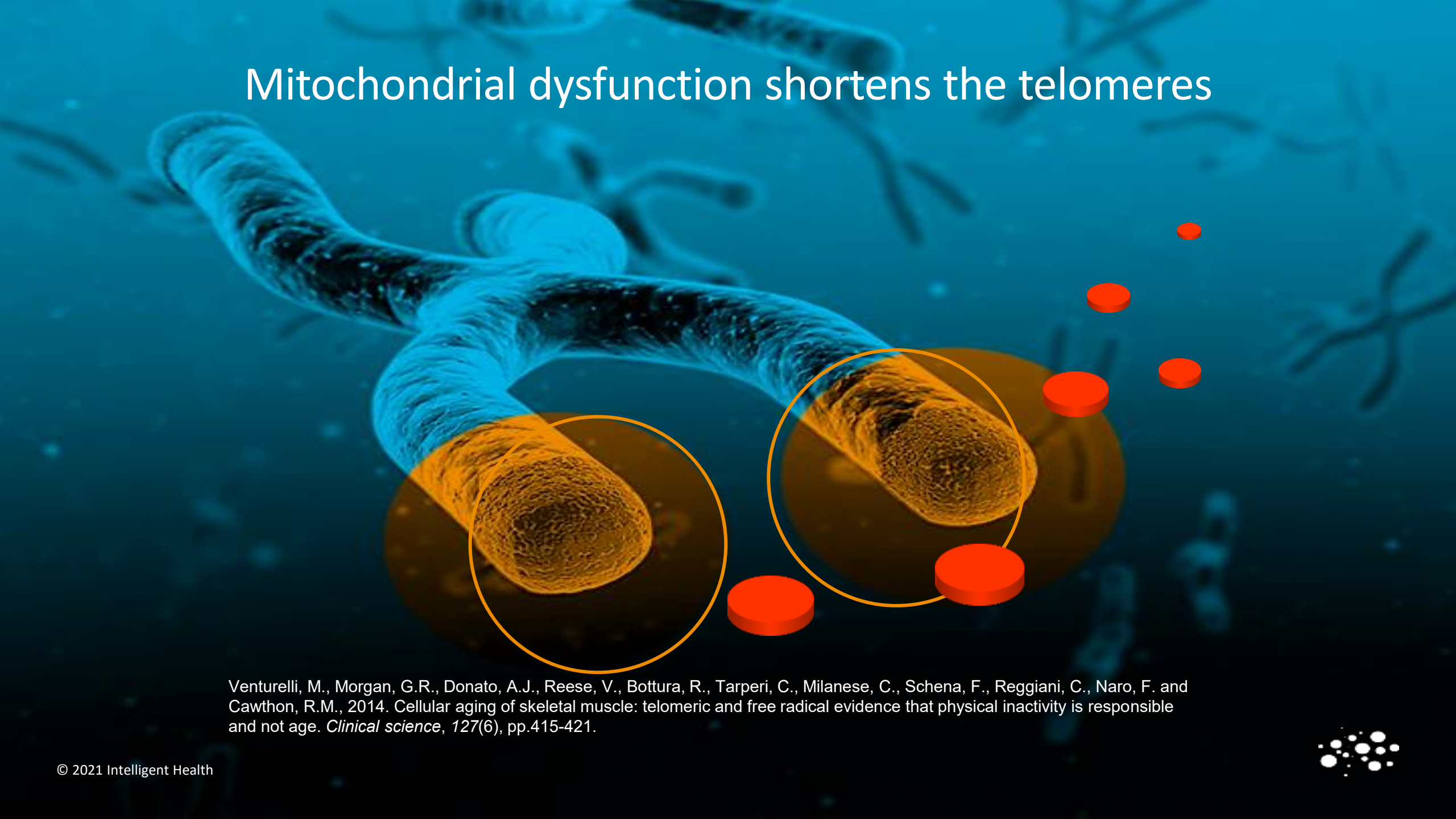
# Rural children have a larger Hippocampus compared to urban children

Kühn, et al 2020. Brain structure and habitat: Do the brains of our children tell us where they have been brought up?. NeuroImage, 222, p.117225.

# Children aged 5-7yrs: Longer time spent in public green spaces was associated with longer telomeres

Miri, M., de Prado-Bert, P., Alahabadi, A., Najafi, M.L., Rad, A., Moslem, A., Aval, H.E., Ehrampoush, M.H., Bustamante, M., Sakhvidi, M.J.Z. and Nawrot, T., 2020. Association of greenspace exposure with telomere length in preschool children. *Environmental Pollution*, p.115228.

# Mitochondrial dysfunction shortens the telomeres



Venturelli, M., Morgan, G.R., Donato, A.J., Reese, V., Bottura, R., Tarperi, C., Milanese, C., Schena, F., Reggiani, C., Naro, F. and Cawthon, R.M., 2014. Cellular aging of skeletal muscle: telomeric and free radical evidence that physical inactivity is responsible and not age. *Clinical science*, *127*(6), pp.415-421.

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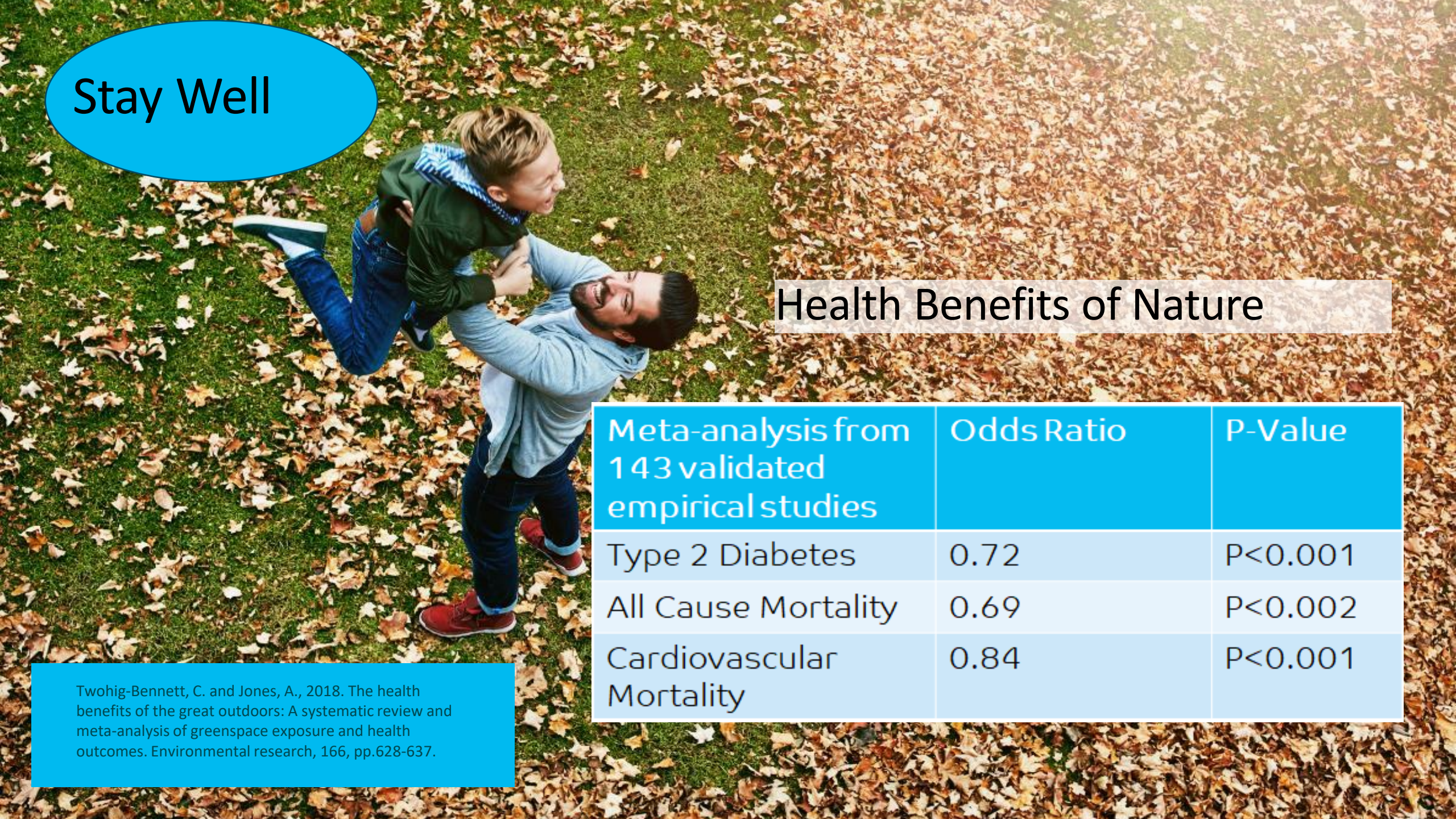
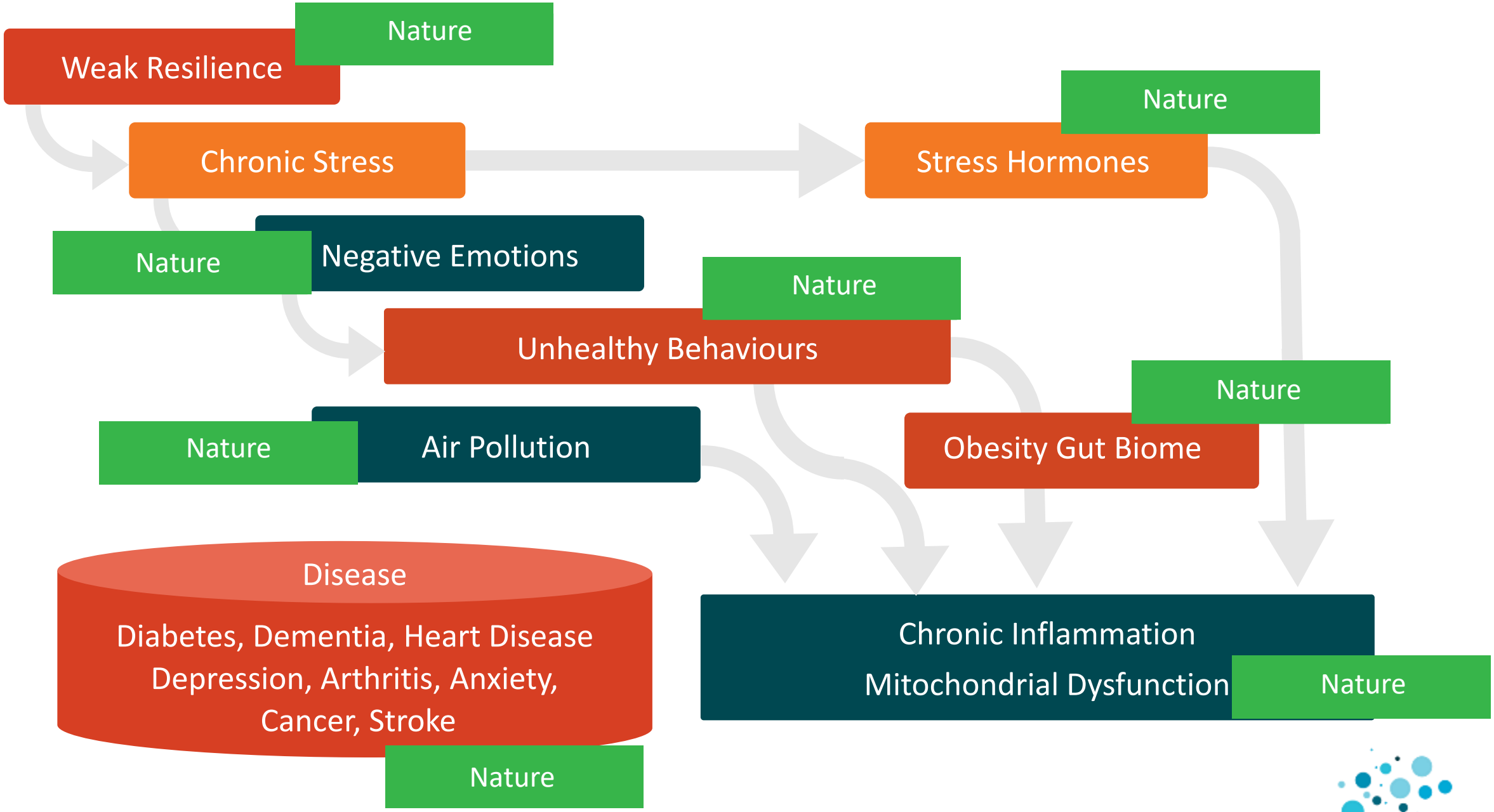
# Stay Well



## Health Benefits of Nature

| Meta-analysis from 143 validated empirical studies | Odds Ratio | P-Value |
|---|---|---|
| Type 2 Diabetes | 0.72 | P<0.001 |
| All Cause Mortality | 0.69 | P<0.002 |
| Cardiovascular Mortality | 0.84 | P<0.001 |

Twohig-Bennett, C. and Jones, A., 2018. The health benefits of the great outdoors: A systematic review and meta-analysis of greenspace exposure and health outcomes. Environmental research, 166, pp.628-637.

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# Heat

- Hot weather is associated with increased deaths mainly from heart disease within 24 hours.
- Extreme heat is doubling every 10 years since 1979
- Every 0.1C of global temperature exposes a further 100 million people to extreme heat.
- By the end of the century no major city will safely be able to hold a summer Olympic Games due to extreme heat.

# Floods

- The Environment Agency update finds that 8 million (“one in four properties”) could be liable to flooding  by mid-century when accounting for climate change.
- Globally, flood hazard could ~increase by up to 50 % if we don’t restrain emissions.
- Depression outcomes were elevated by 8-fold and PTSD by 14-fold among flooded compared with unaffected participants

# Sleep

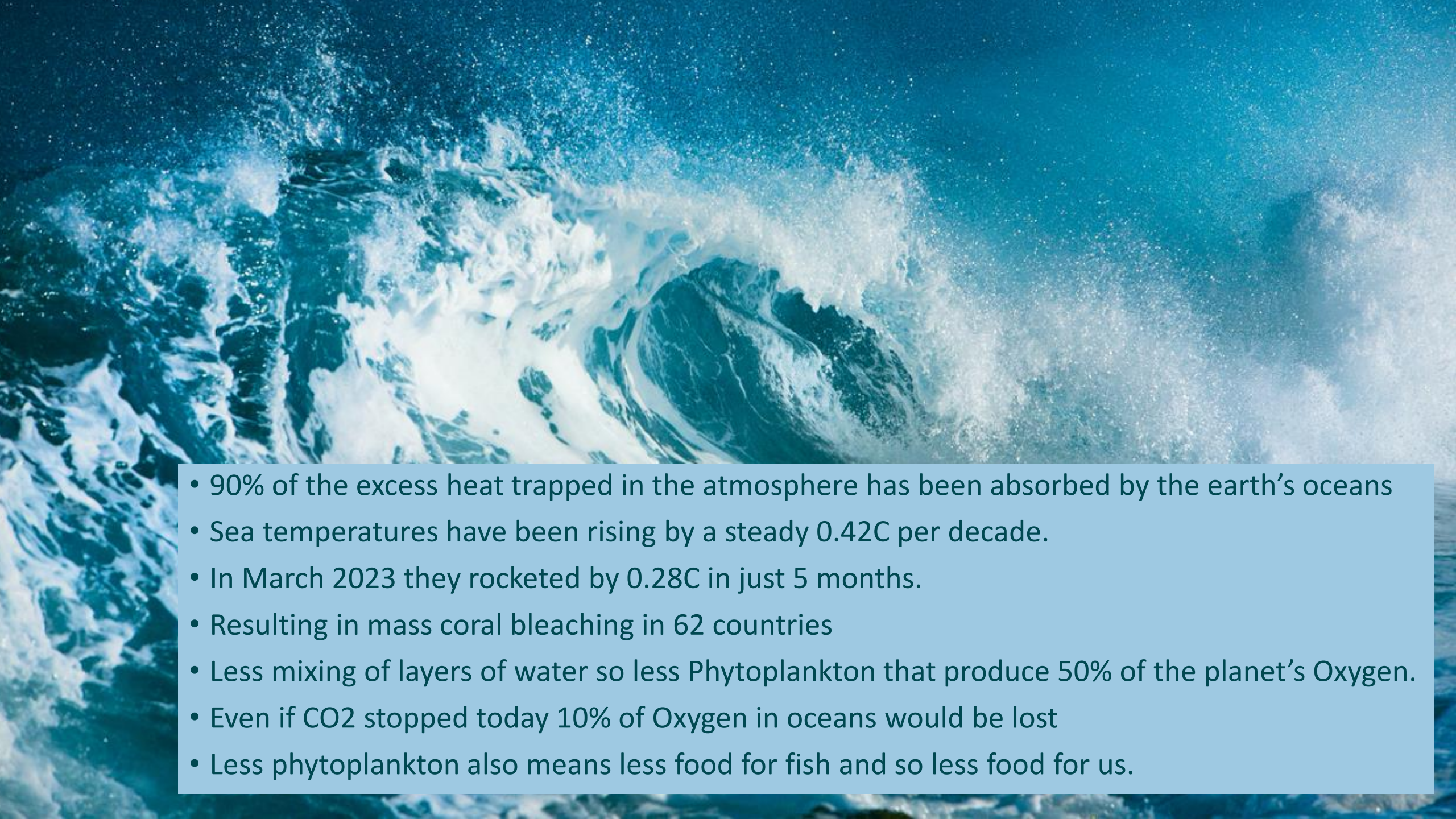
For every rise in night-time temperature of 10C there is 20% less sleep across a population.

# Food supply

- Food crisis is already here.
- More heat requires more intense farming
- This requires more water and more energy
- Food inflation has already started
- 700 million people face hunger 9% of the population
- That’s 150 million people more than in 2019

# Food supply

- Brazil produces 10% of global food and 50% of all Soya Bean and 30% of all Beef.
- 18% of the Amazon is already deforested if this reaches 20-25% and the global temperature exceeds 2C then we could reach a tipping point and the hotter drier climate may make food production impossible.



- 90% of the excess heat trapped in the atmosphere has been absorbed by the earth’s oceans
- Sea temperatures have been rising by a steady 0.42C per decade.
- In March 2023 they rocketed by 0.28C in just 5 months.
- Resulting in mass coral bleaching in 62 countries
- Less mixing of layers of water so less Phytoplankton that produce 50% of the planet’s Oxygen.
- Even if CO2 stopped today 10% of Oxygen in oceans would be lost
- Less phytoplankton also means less food for fish and so less food for us.

# HEALTH CO-BENEFITS OF ACTION ON CLIMATE CHANGE

**Tackles health Inequality**

**↑ Energy Efficiency of Homes**
**Cheaper to heat**
Improves physical and mental health

**↑ Locally Sourced Plant Based Diets**
Improves food security, nutritional status and tackles obesity
Improves physical and mental health

**↑ Walking and Cycling**
Reduce air pollution, increases population fitness, reduces obesity
Improves physical and mental health

**Community Action**
Helps builds social connections – tackles isolation
Increases community resilience
Alleviates eco-distress
Improves Mental Health

**↑ Access to Green and Blue Spaces**
Trees cool cities and reduce air pollution
Time in natural spaces reduces stress and health inequalities
Improves physical and mental health

Take sufficient Physical Activity

# Over 2,500 trees were earned through playing Beat the Street in Burnley (2000 points = 1 tree)

Schools and community groups were invited back to help plant them across the borough.

The combination of tree planting and active community engagement helps foster a sense of pride of Place

(52) Beat the Street helped facilitate the creation of the Outdoor Town (Burnley) Using points as a currency 2,500 trees were purchased and planted by the families in Burnley

Insights

# Building Active Communities

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