

HEALTHY TREES HEALTHY PEOPLE

MATILDA VAN DEN BOSCH, MD, PHD
DEPARTMENT OF FOREST AND CONSERVATION SCIENCES, UBC
SCHOOL OF POPULATION AND PUBLIC HEALTH, UBC



Ten leading causes of burden of disease, world, 2004 and 2030

2004 Disease or injury	As % of total DALYs	Rank		Rank	As % of total DALYs	2030 Disease or injury
Lower respiratory infections	6.2	1	→	1	6.2	Unipolar depressive disorders
Diarrhoeal diseases	4.8	2	→	2	5.5	Ischaemic heart disease
Unipolar depressive disorders	4.3	3	→	3	4.9	Road traffic accidents
Ischaemic heart disease	4.1	4	→	4	4.3	Cerebrovascular disease
HIV/AIDS	3.8	5	→	5	3.8	COPD
Cerebrovascular disease	3.1	6	→	6	3.2	Lower respiratory infections
Prematurity and low birth weight	2.9	7	→	7	2.9	Hearing loss, adult onset
Birth asphyxia and birth trauma	2.7	8	→	8	2.7	Refractive errors
Road traffic accidents	2.7	9	→	9	2.5	HIV/AIDS
Neonatal infections and other ^a	2.7	10	→	10	2.3	Diabetes mellitus
COPD	2.0	13	→	11	1.9	Neonatal infections and other ^a
Refractive errors	1.8	14	→	12	1.9	Prematurity and low birth weight
Hearing loss, adult onset	1.8	15	→	15	1.9	Birth asphyxia and birth trauma
Diabetes mellitus	1.3	19	→	18	1.6	Diarrhoeal diseases

RISK FACTORS

- Stress
- Loneliness
- Physical inactivity
- Urban living



Living by OiMax, CC BY 2.0



Loneliness by Irina Souiki CC BY-NC-ND 2.0



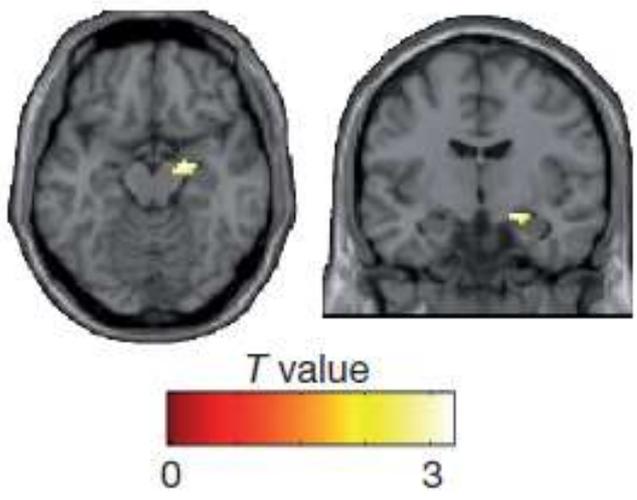
Trees and green spaces counteract many of these risk factors!



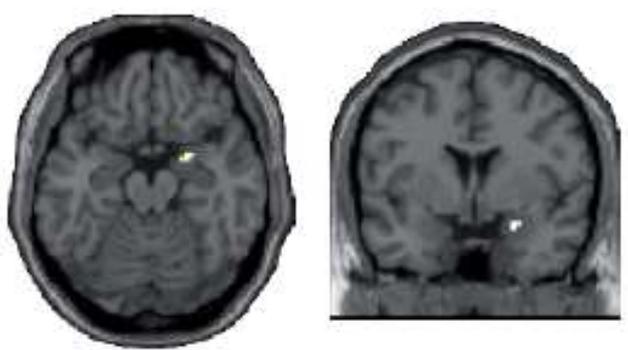
People from the countryside cope better with **stress**



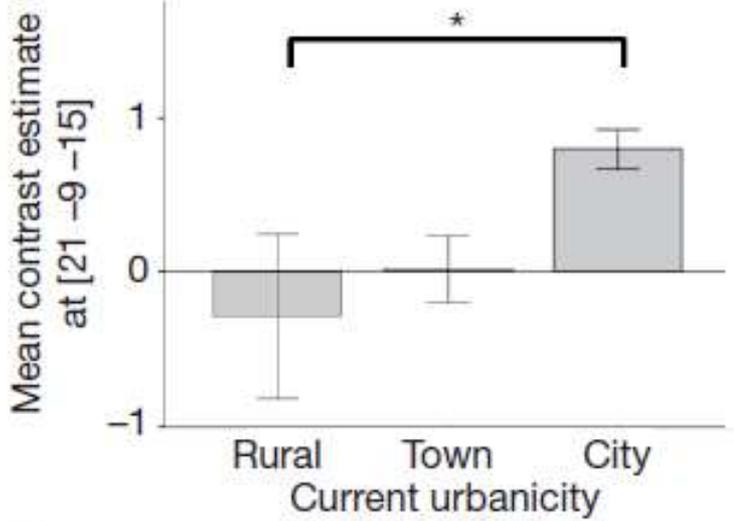
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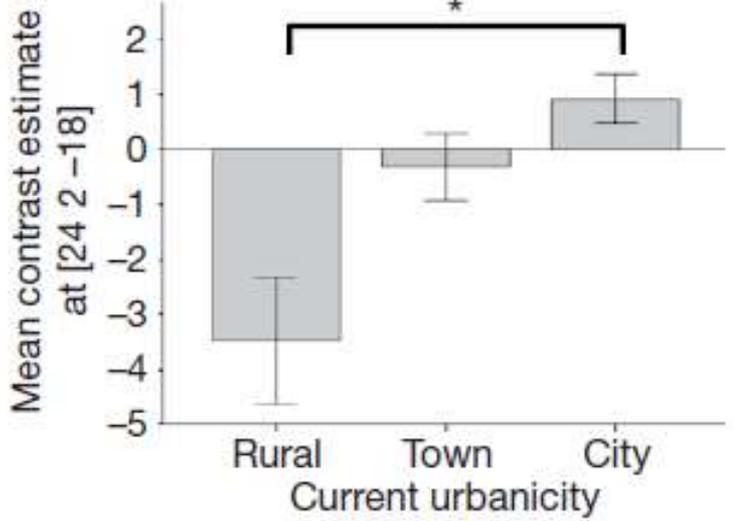
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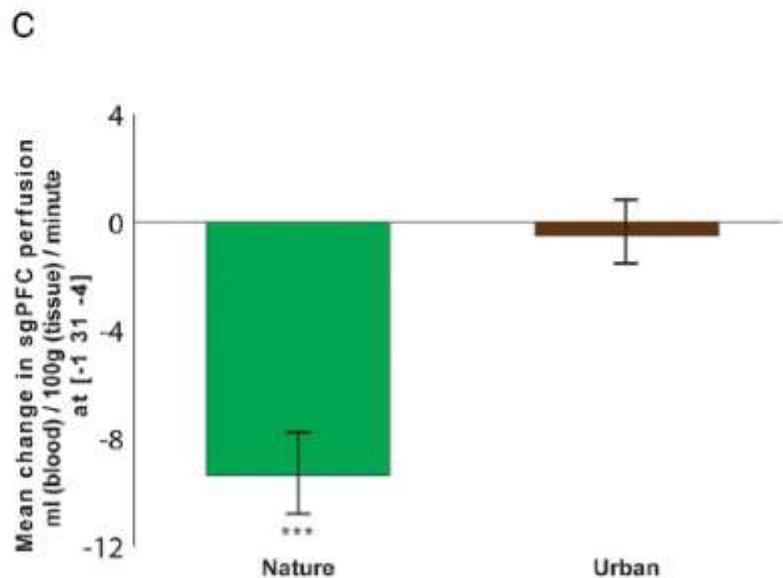
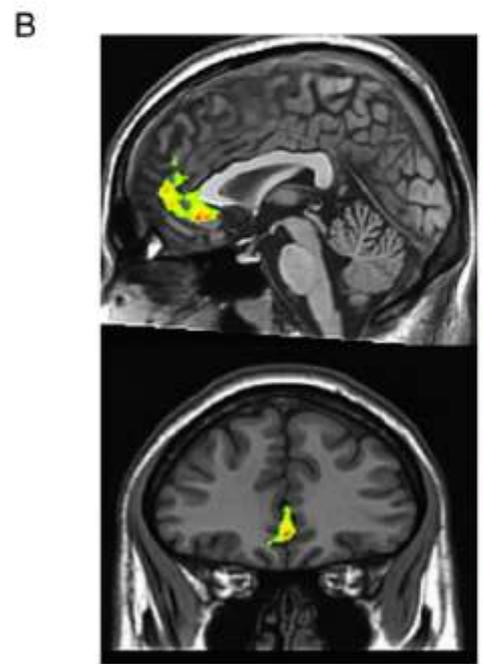
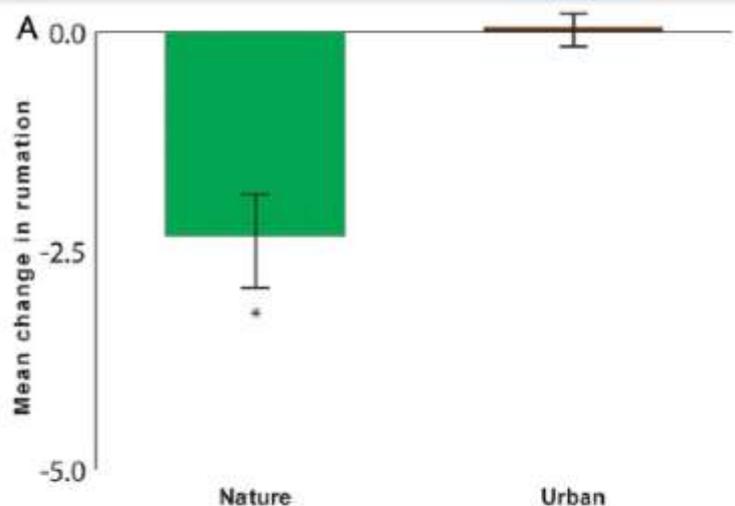


d



Green space reduces symptoms of depression

Bratman et al. 2015.



PSYCHOLOGICAL AND COGNITIVE SCIENCES

Fig. 1. The impact of nature experience on self-reported rumination and blood perfusion to the sgPFC. (A) Change in self-reported rumination (postwalk minus prewalk) for participants randomly assigned to take a 90-min walk either in a natural setting or in an urban setting. (B) A time-by-environment interaction in blood perfusion was evident in the sgPFC. *F* map of significant interactions at a threshold of $P < 0.05$, FWE corrected for multiple comparisons. (C) Change in blood perfusion (postwalk minus prewalk) for participants randomly assigned to take a 90-min walk either in a natural setting or in an urban setting. Error bars represent SE within subjects: * $P < 0.05$, *** $P < 0.001$.

STRESS REDUCTION IN A GREEN LAB



Trier Social Stress Test (TSST):

1. Presentation

2. Arithmetic task: 1671-13-13-13-13.....0



REAL TSST



VIRTUAL TSST



VIRTUAL FOREST



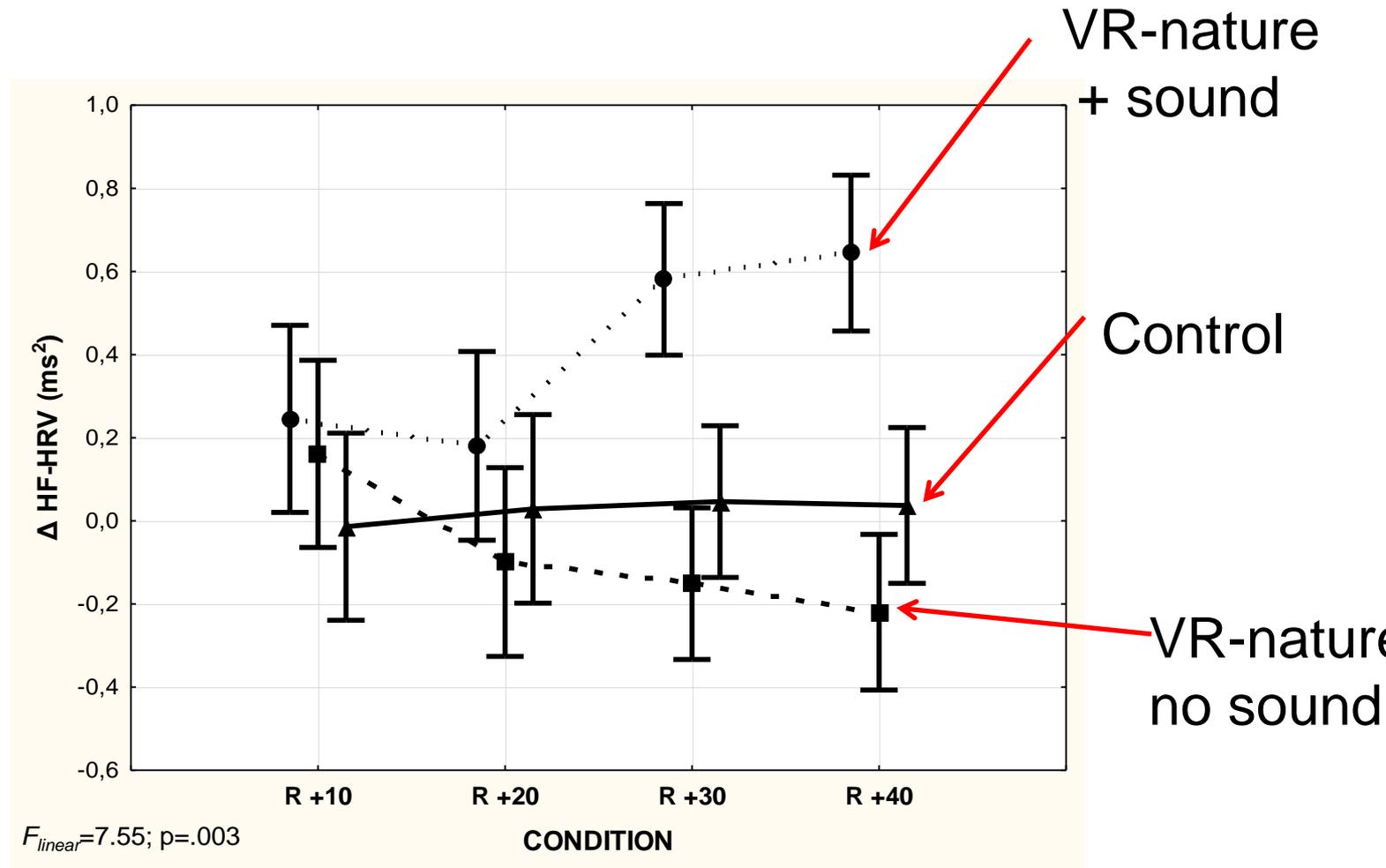




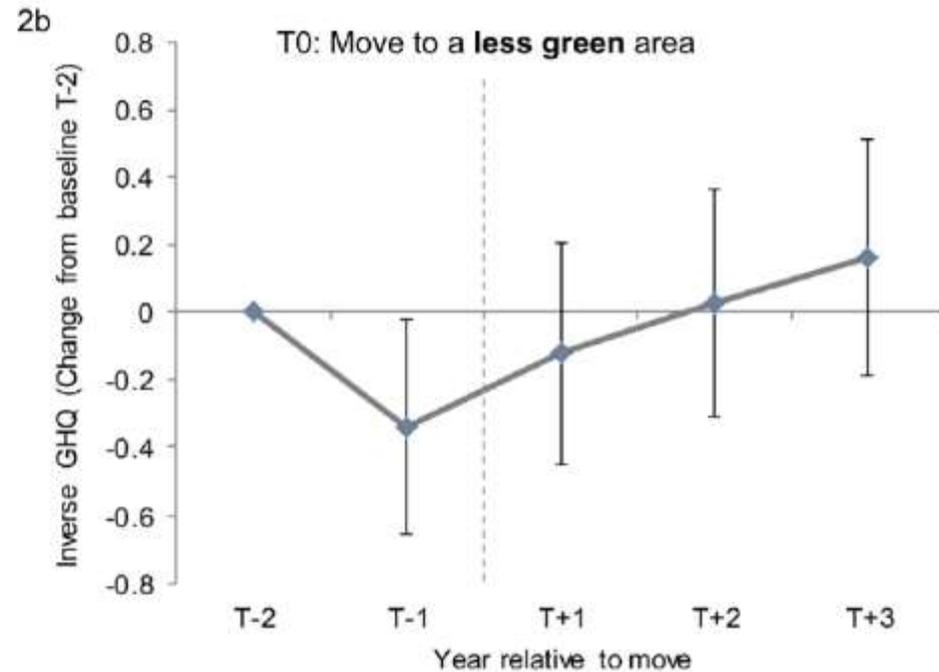
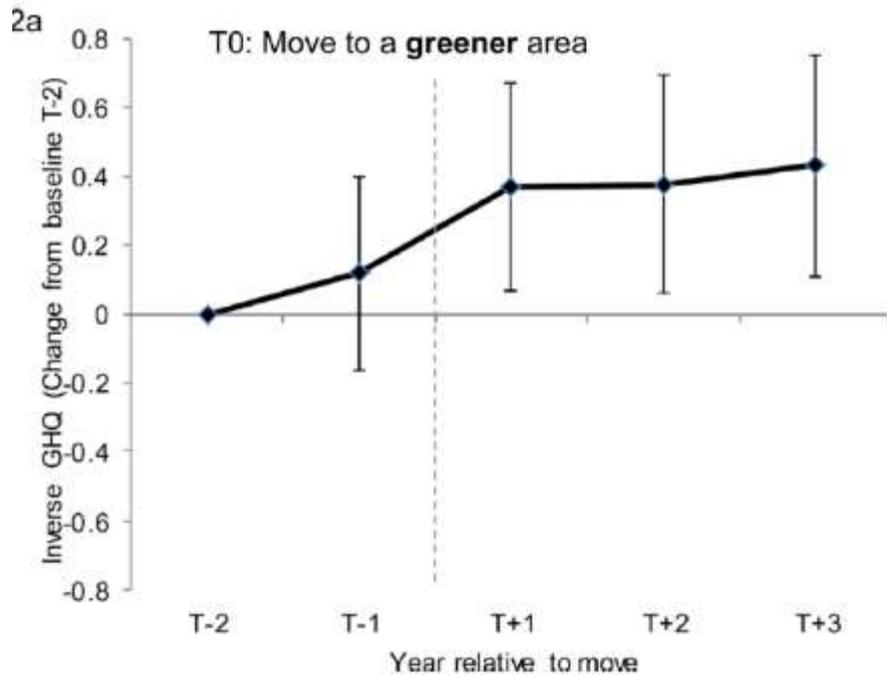
QUANTSINI



Improved stress recovery in virtual forest with nature sounds



Moving to green areas improves your mental health



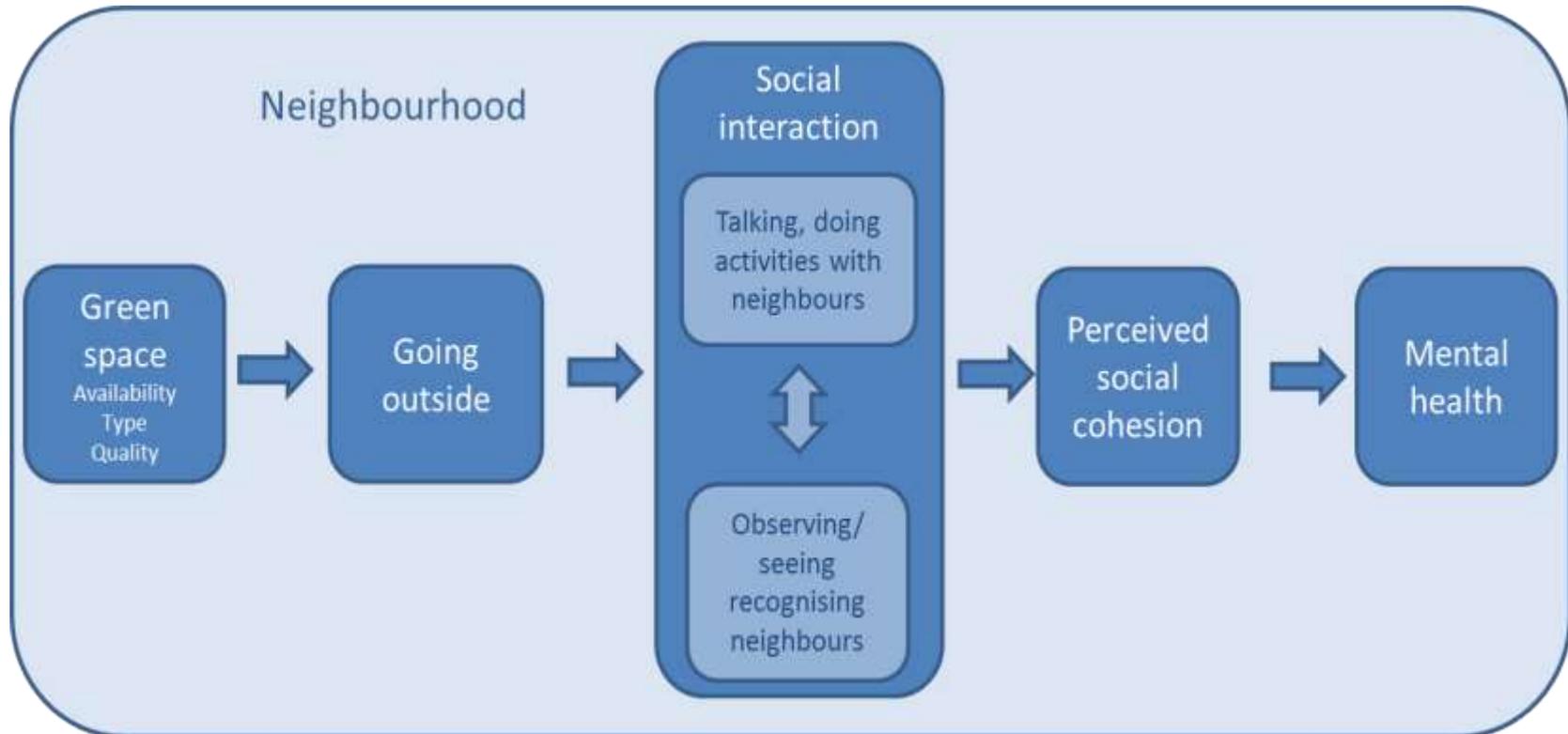
Alcock et al. 2014. *Longitudinal effects on mental health of moving to greener and less green urban areas*. Environmental Science and Technology

LONELINESS AND SOCIAL ISOLATION

- More dangerous to health than **smoking** 15 cigarettes a day
- Inflammation, heart disease, stroke, dementia, obesity, mortality
- **Increasing** problem
- More common in **vulnerable groups**, such as immigrants and elderly
- More common in **big cities**



GREEN SPACES CONTRIBUTE TO SOCIAL COHESION



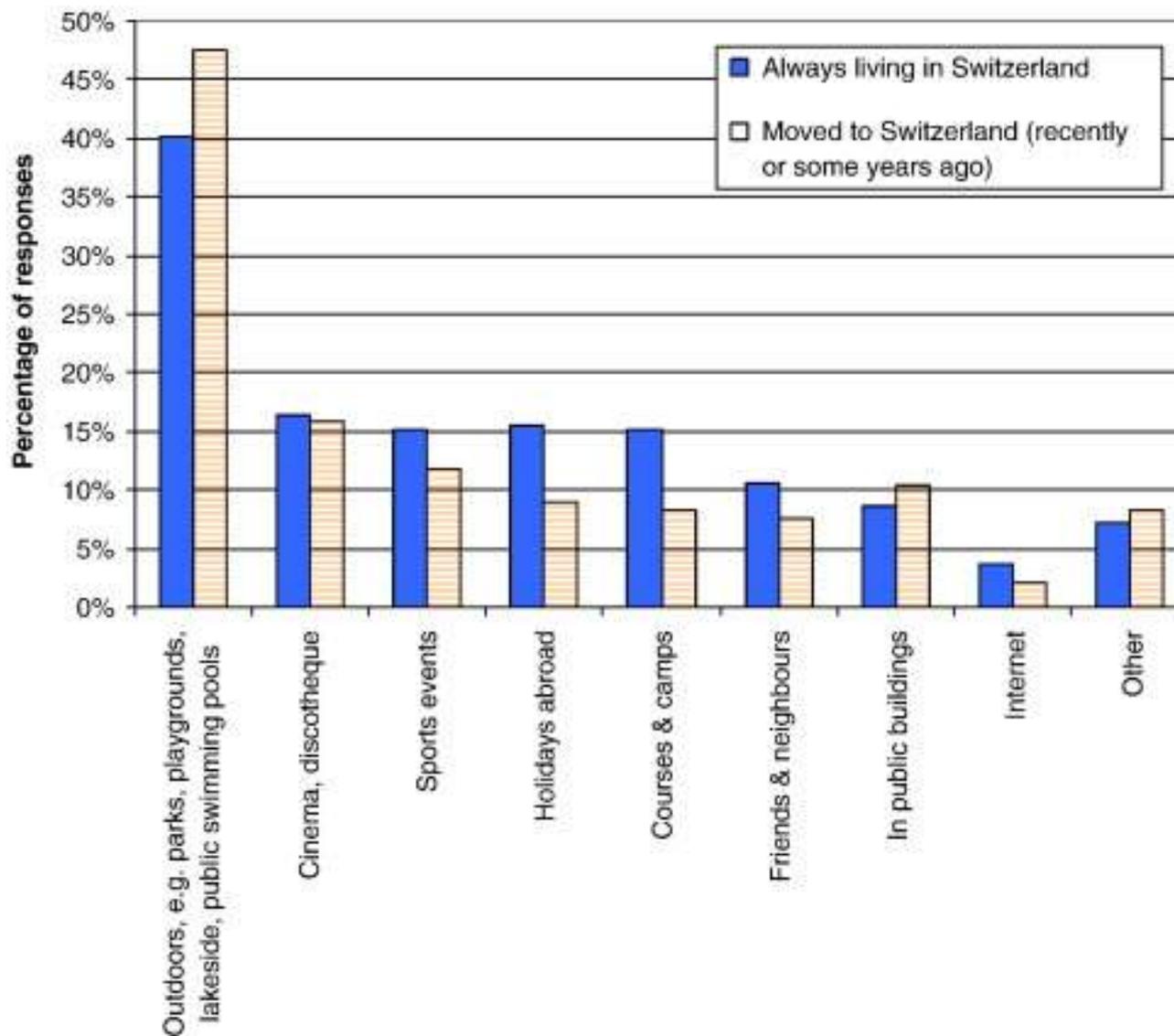
Elands et al. 2017. In Press



GREEN SPACE CHARACTERISTICS THAT INFLUENCE SOCIAL INTERACTION



Factor	Examples
Availability	Proximity, size
Type	Urban parks (varying from neighbourhood parks to city parks) Community gardens
Quality	Design: good physical access , aesthetics, safety Plants: presence of trees and grass, variety of plant species (both native and exotic) Choreography of spaces: multifunctionality and multi-user groups Management: well-managed and room for self-organisation



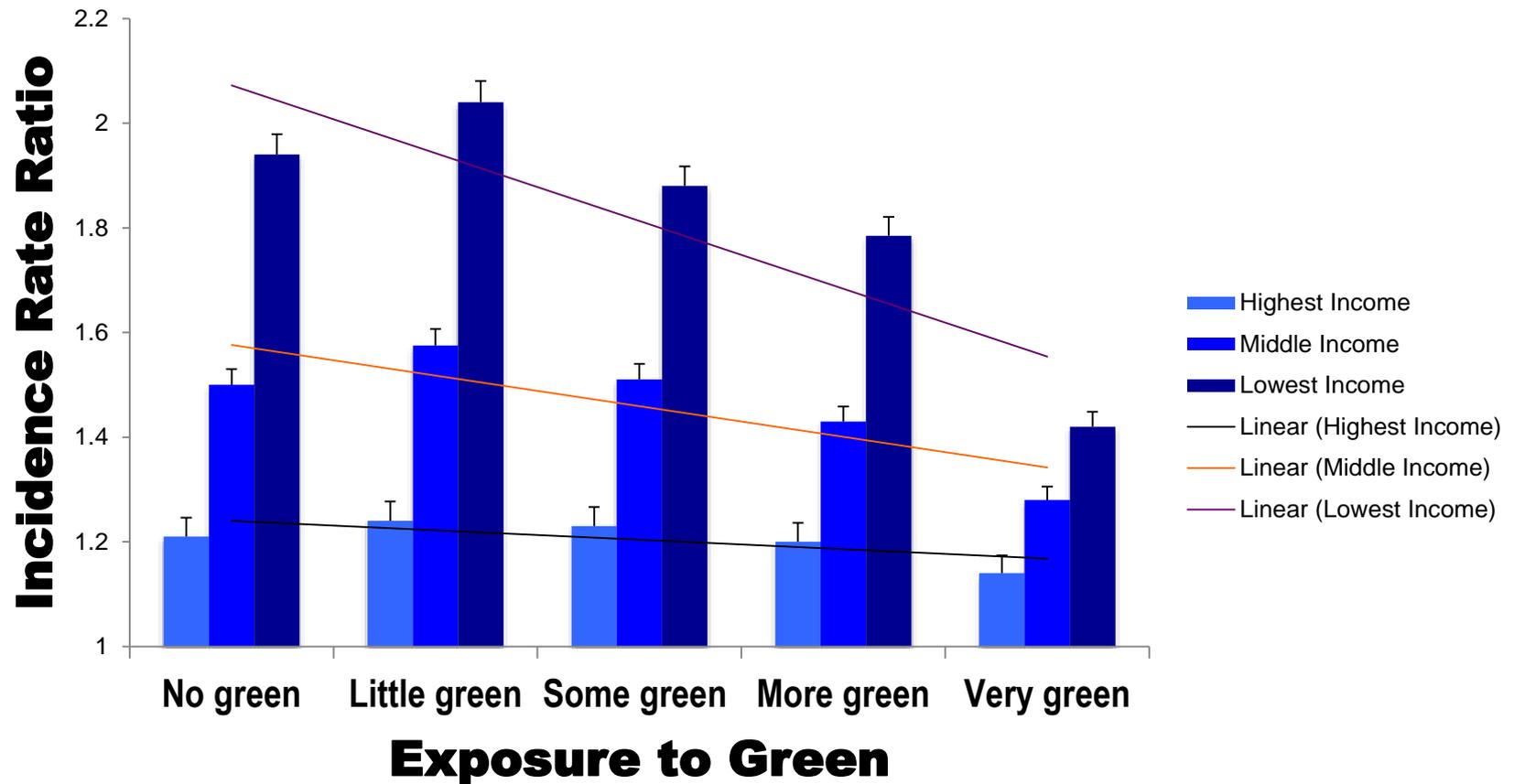
‘Where, besides school, can you easily make new friends?’.

Klaus Seeland, Sabine Dübendorfer, Ralf Hansmann

Making friends in Zurich's urban forests and parks: The role of public green space for social inclusion of youths from different cultures

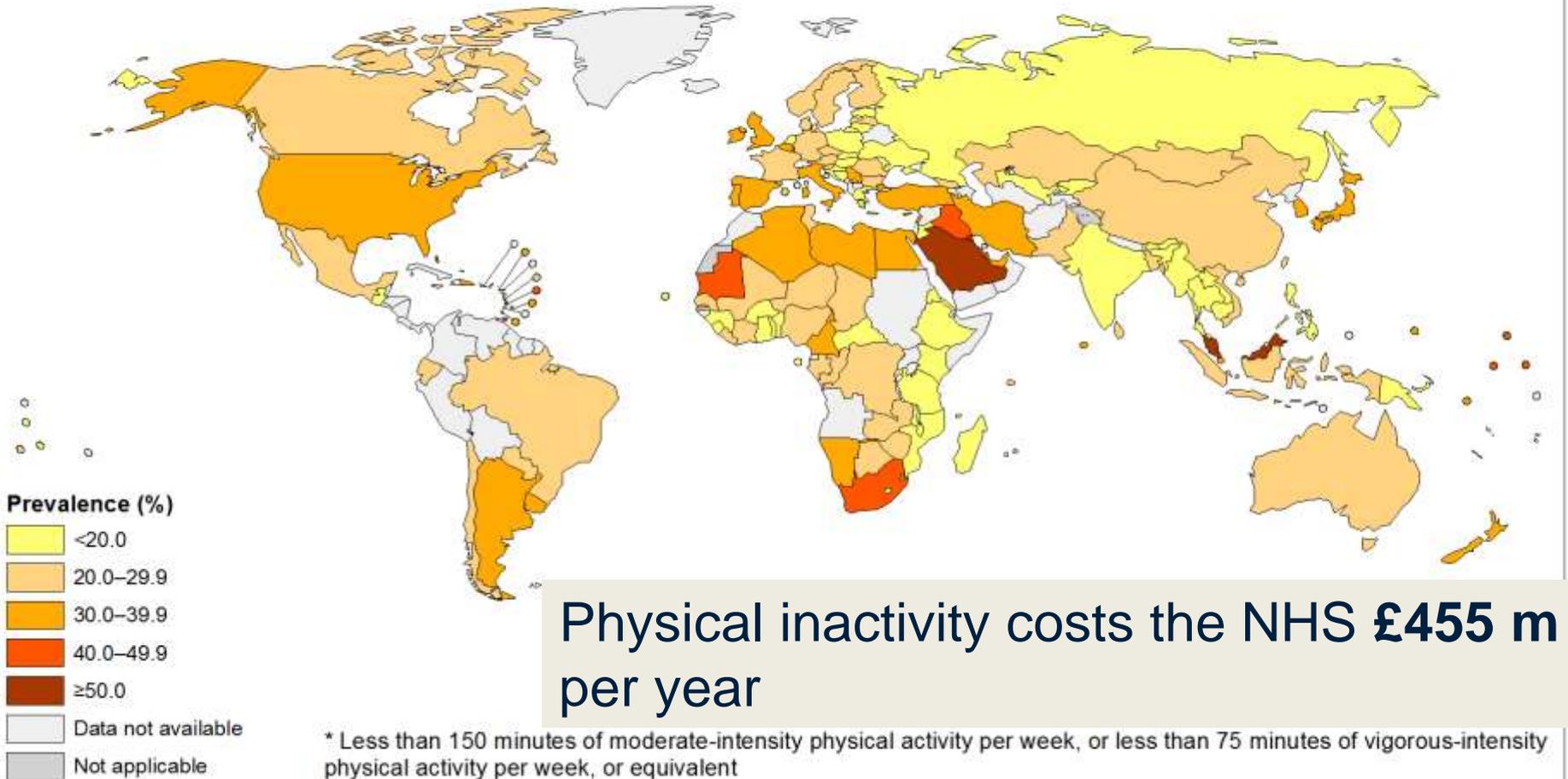
Forest Policy and Economics, Volume 11, Issue 1, 2009, 10–17

HEALTH IMPACT OF SOCIOECONOMIC INEQUALITIES ARE REDUCED IN GREEN AREAS



Mitchell and Popham, 2008. The Lancet

Prevalence of physical inactivity* among adults, ages 18+ (age standardised estimates) Both sexes



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Health Statistics and Information Systems (HSI)
World Health Organization



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GREEN SPACE AND PHYSICAL ACTIVITY – THE EVIDENCE

“Adolescent girls who live near **more parks**, ..., engage in more ... **moderate/vigorous physical activity** than those with fewer parks”

Cohen et al. 2006

“an extra **\$10** spent per capita on **parks and recreation** was associated with **one-third of a day more** per week of **vigorous exercise** by girls”

Goodbey and Mowen, 2010



PHYSICAL ACTIVITY IN GREEN SPACES

Increases the positive effects!



Photo credit: Michael Jerrett

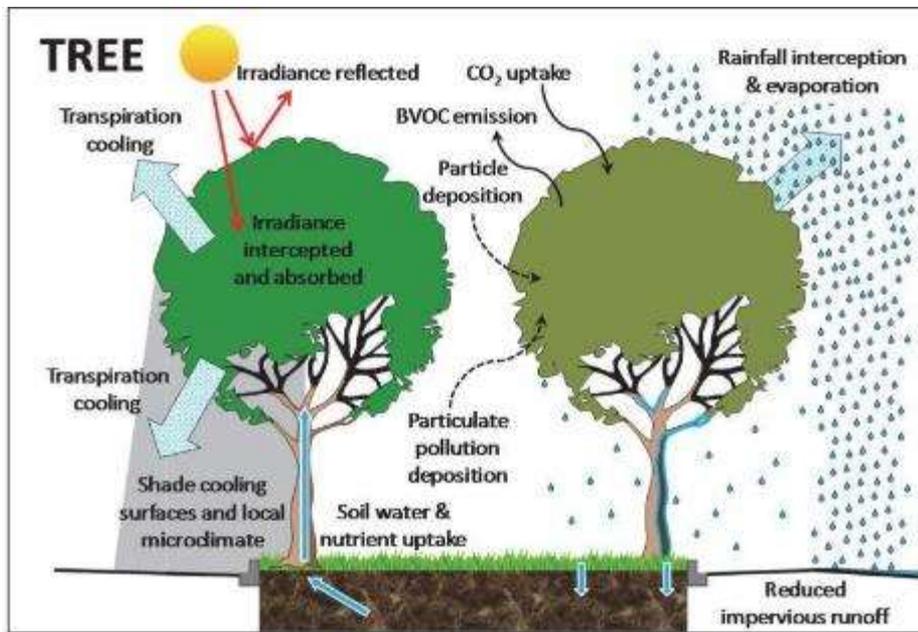


Photo credit: Rudd Center for Food Policy & Obesity

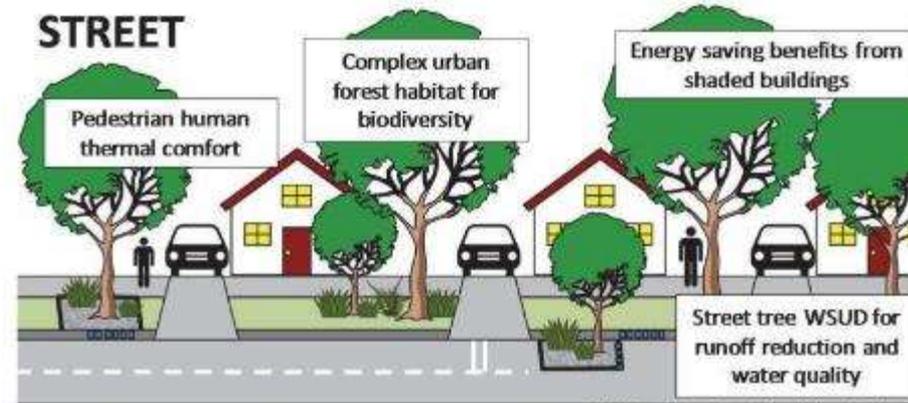
E.g. *Mitchell et al. 2013*:
“physical activity in natural environments is associated with a **reduction in the risk of poor mental health** to a greater extent than physical activity in other environments.”



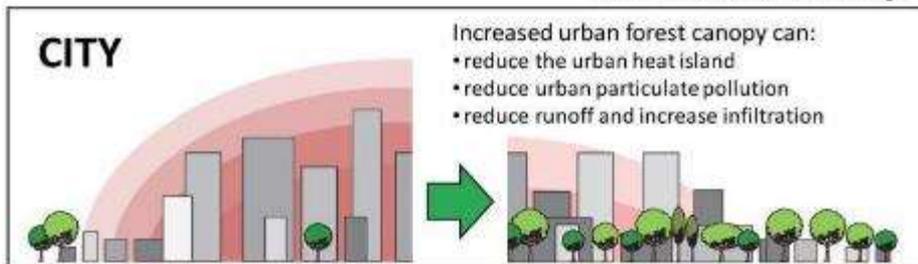
Photo credit: Rudd Center for Food Policy & Obesity



BVOC = Biological volatile organic compounds



WSUD = Water Sensitive Urban Design



ECOSYSTEM SERVICES

- cooling
 - storm water run-off
 - urban water quality
 - air pollution removal
- Less **heat** related morbidity and mortality
 - Less risk for **drowning** accidents
 - Less risk for **infections** from contaminated water
 - Improved **respiratory health** and lower prevalence of asthma

Escobedo and Nowak, 2009; Livesley et al., 2014, 2015, 2016; McPherson et al., 2011; Norton et al. 2015; Sugawara et al. 2016; Scharenbroch et al. 2016; Denman et al. 2016

FROM GREEN SPACE TO RISK FACTORS TO HEALTH OUTCOMES

REDUCED

- symptoms of **ADHD** (e.g. *Kuo & Taylor, 2004*)
- **mortality** in megacities (e.g. *Takano et al. 2012*)
- **cardiovascular** and **respiratory illness** (e.g. *Tamosiunas et al. 2014*)
- **depression** (e.g. *McEachan et al. 2016*)

IMPROVED

- **pregnancy outcomes** (e.g. *Hystad et al. 2014*)
- **cognitive capacity** (e.g. *Dadvand et al. 2015*)
- **wellbeing and happiness** (e.g. *MacKerron & Mourato, 2013*)



ALL GOOD THEN...?

“...scientific knowledge about Ecosystem Services continues to have **limited impact** on policy and decisions.” (*Posner et al. 2016*)



Urban tree canopy is **declining** globally and in UK (*Britt & Johnson, 2008*)

Poor green planning in rapidly urbanizing countries in developing parts of the world (*Quereshi et al. 2010*).



Parks hit again in council budget cuts

13 April 2012, by Jez Abbott and news staff, *Be the first to comment*

Maintenance teams, plant spending and street trees all face cutbacks as local authorities battle to meet savings targets.



Parks: negotiations are continuing on how budget reductions will bite on communities' green spaces - image: Morguefile

The latest local authority spending round for 2012-13 is seeing more parks services facing cuts of up to 20 per cent, while a number have won a respite from the axe thanks in part to "front loading" of their budget reductions in 2011-12.

Sheffield: **17% cuts** for parks, woodlands and open spaces; merging and reducing parks and open-space

Liverpool: **22% cut** in budget for green space management

Newcastle: reduced maintenance of green spaces and tree-inspection services (loss of ~ **20 jobs**)

London, Leeds, Brighton, etc.

UK's public parks face 'decline and neglect'

Heritage Lottery Fund report warns of a continuing a decline in the condition of parks as austerity budget cuts squeeze council budgets



The Guardian,
7 Sep, 2016

UK parks are near crisis point because of budget cuts, say campaigners

Study finds 86% of park managers have had budgets cut and almost half of councils are considering selling green spaces



The Guardian,
2014

10 more trees per city block:

- increased **health perception** equivalent to the effect of a **\$10,200** increase in annual household income and being **7 years younger**.

Scientific studies

10 more trees per city block:

- cost between **\$300** and **\$5,000**.



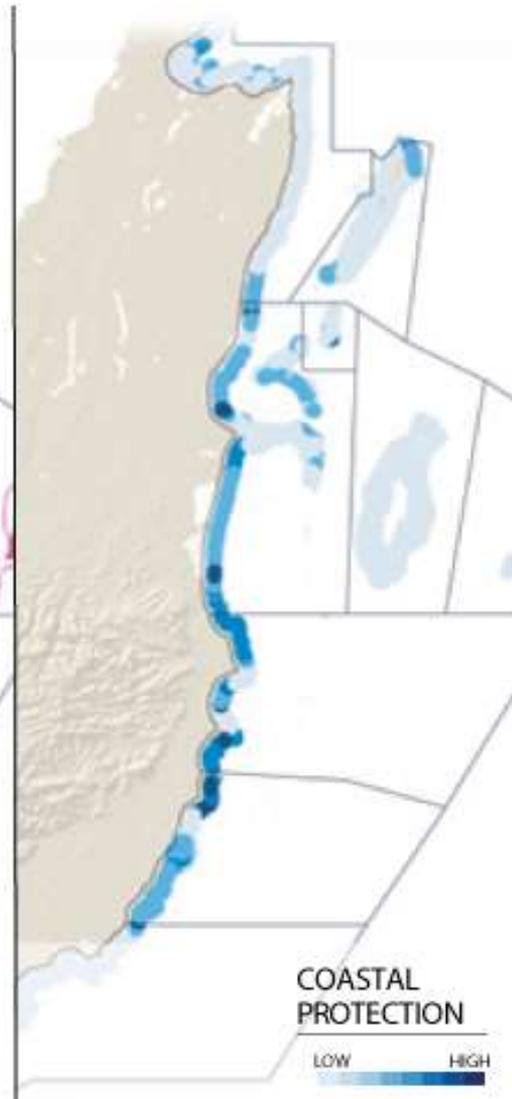
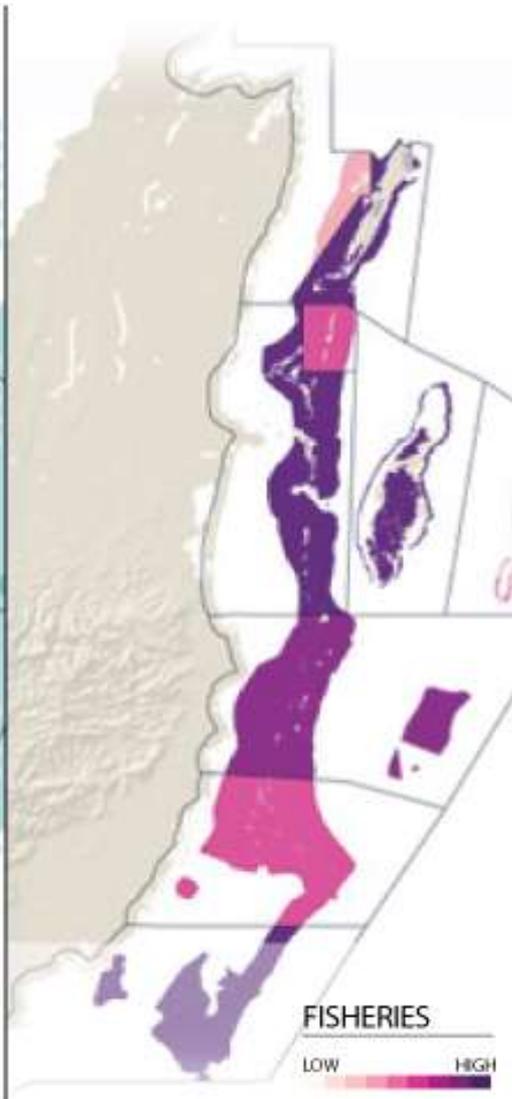
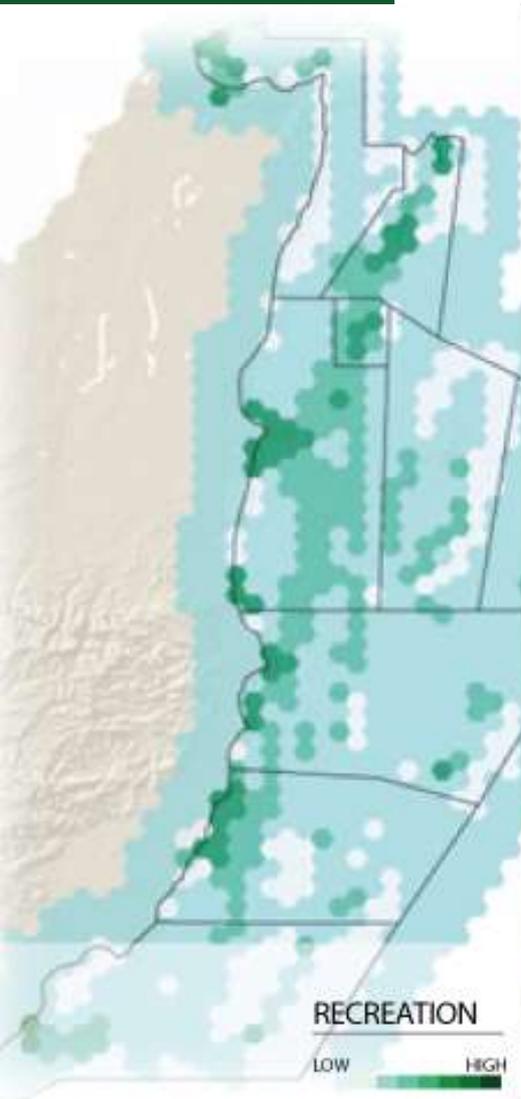
Kardan et al. 2015. *Neighborhood greenspace and health in a large urban center*. Nature. Scientific Reports

InVEST

integrated valuation of
ecosystem services
and tradeoffs

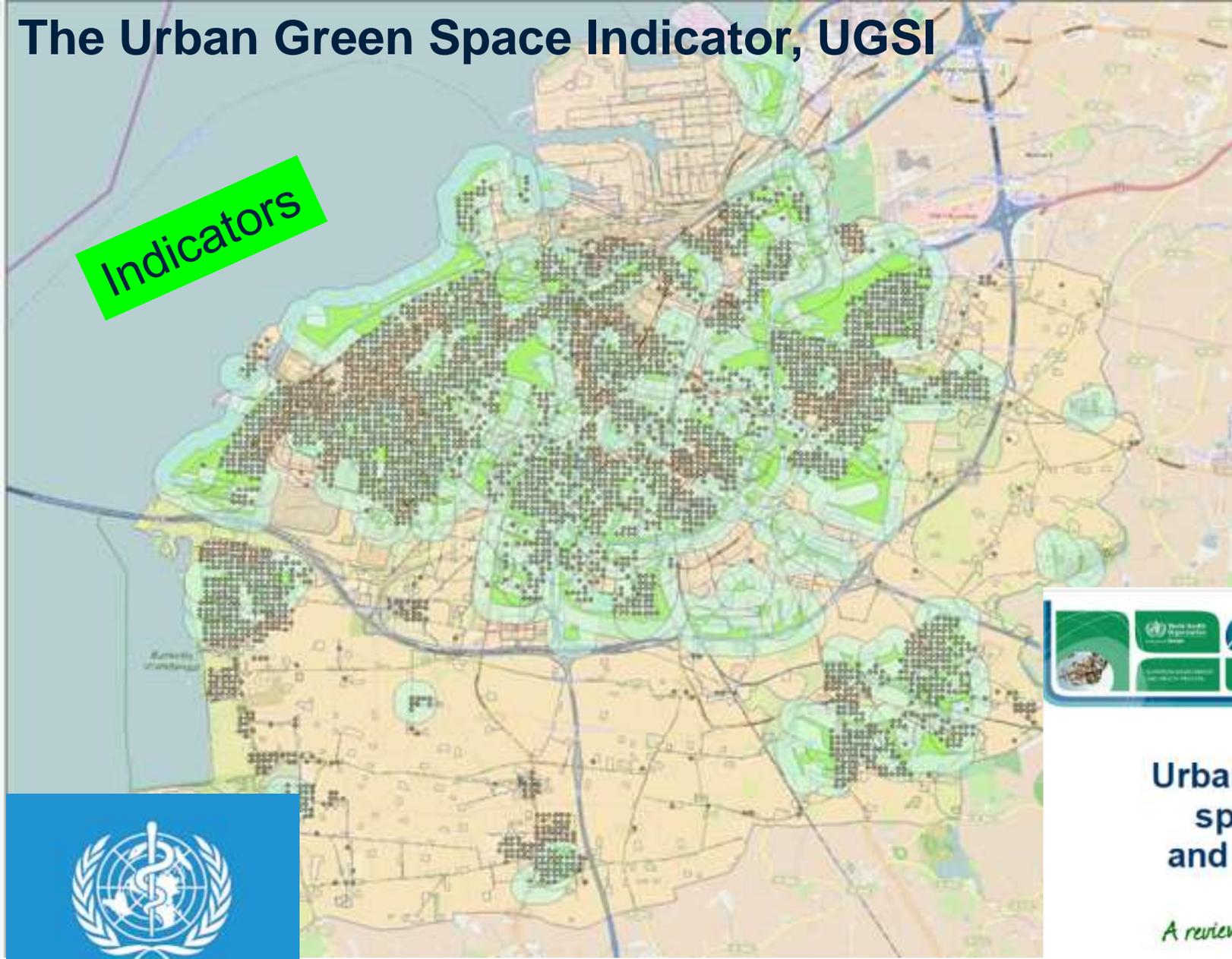
Tools

natural
capital
PROJECT



The Urban Green Space Indicator, UGSI

Indicators



Urban green spaces and health

A review of evidence



A photograph showing a person lying on their back on a paved sidewalk in Dubai, 2015. The person is wearing a light blue t-shirt and dark blue trousers, and is barefoot. They are lying on a piece of cardboard. The sidewalk is made of grey bricks and is bordered by green plants on the left and a road with trees on the right. The scene is brightly lit, suggesting a sunny day.

“Finding sustainable solutions to the health challenges ... will require more fluid academic and government structures to enhance collaboration across traditional boundaries”

The Lancet, 1st April, 2017

Exhausted worker in Dubai, 2015
photo: Kamran Jibreili

THANKS FOR LISTENING AND LET'S INTERACT MORE!

matilda.vandenbosch@ubc.ca