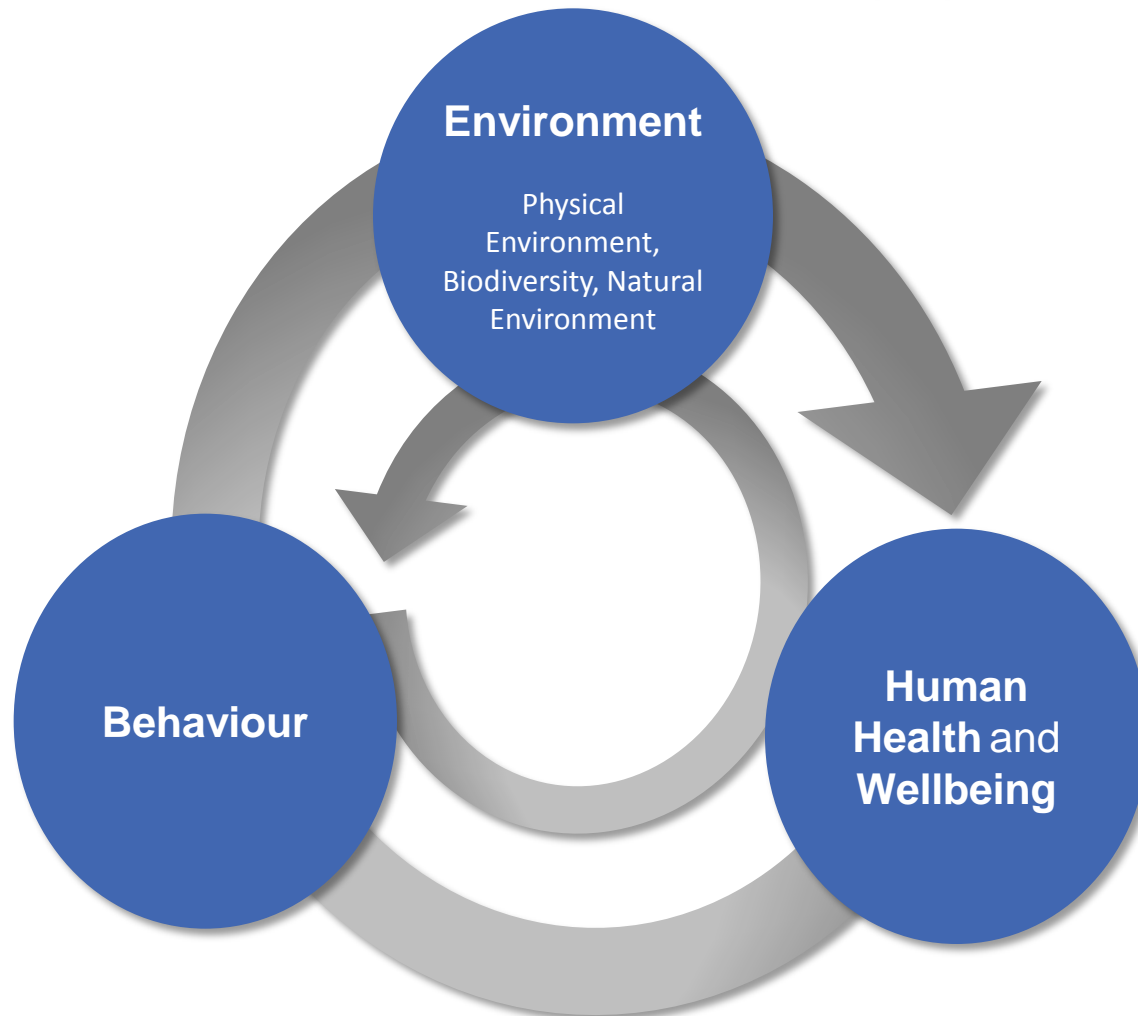


# Oceans and Human Health: Brief Overview

LE Fleming, N McDonough, M White, M Depledge, M Austen, S Pahl



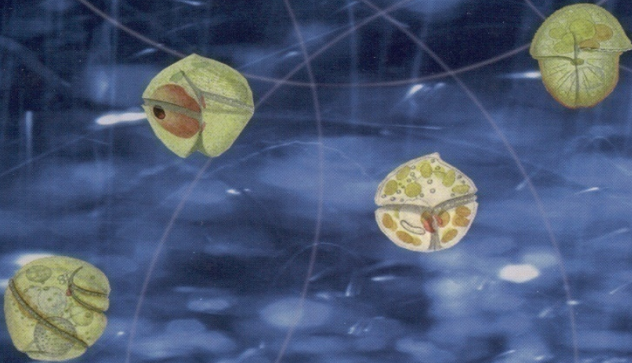
# Interconnections: Environment ↔ Human Health



# FROM MONSOONS TO MICROBES



Understanding the Ocean's Role in Human Health



NATIONAL RESEARCH COUNCIL

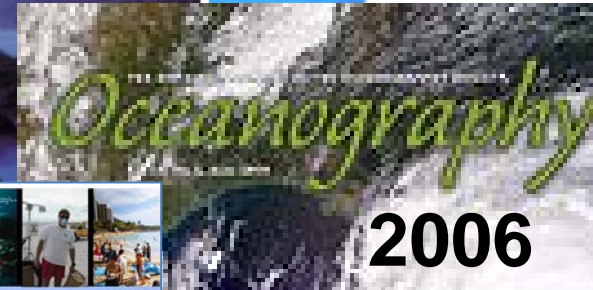
2005



## AN OCEAN BLUEPRINT FOR THE 21st CENTURY

### America's Living Oceans

CHARTING A COURSE FOR SEA CHANGE



2006



2007

2012

1999



# Linking Oceans & Human Health:

A Strategic Research Priority for Europe

Position Paper 19

## International Need:

- **To Increase Understanding of Human and Ecosystem Interactions with the Seas and Oceans**
- **Both Risks AND Benefits/Opportunities**

[www.marineboard.eu](http://www.marineboard.eu)

European  
**MARINE BOARD**  
Advancing Seas & Oceans Science

UNIVERSITY OF  
**EXETER** | MEDICAL  
SCHOOL



European Centre for  
Environment & Human Health

[ecehh.org](http://ecehh.org)



# Linking Oceans & Human Health:

A Strategic Research Priority for Europe

Position Paper 19

European  
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[www.marineboard.eu](http://www.marineboard.eu)

## RISKS:

- **Storms, Climate Events, Climate Change**
- **Harmful Algal Blooms (HABs) & Other Toxins**
- **Infectious Diseases**
- **Anthropogenic Chemicals**
- **Fisheries Destruction**



# Linking Oceans & Human Health:

A Strategic Research Priority for Europe

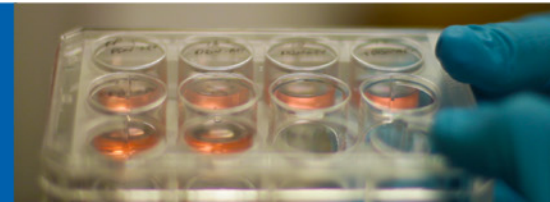
Position Paper 19

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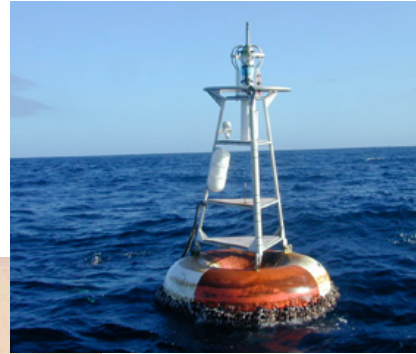
## BENEFITS & OPPORTUNITIES:

- Modelling/Forecasting
- Pharmaceuticals & Other Bioactive Compounds
- Biotechnology
- Marine Organisms as Biomedical Models
- **Coastal Living/“Blue Gym”**



# US NSF NIEHS & NOAA Oceans & Human Health Centers:

## Inter-disciplinary Research, Training, Pilot Projects, Facilities Cores, Shiptime



# 2015

**2 NSF NIEHS OHH Centers + 11 RO1s**

**3 NOAA OHH Centers + Training Grants**



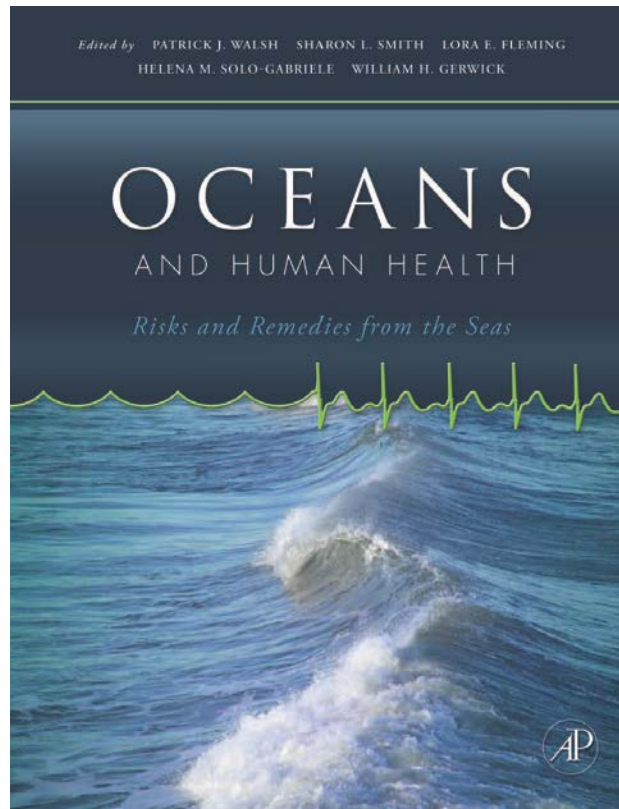


# OHH New Scientific Discipline

 Gordon Research Conferences

## Gordon Conference in **OCEANS & HUMAN HEALTH**

- June 2008
- June 2010
- June 2012
- June 2014



**Oceans and Human Health**  
Implications for Society and Well-Being

Robert E. Bowen, Cinnamon P. Carlame, Michael H. Depledge, Lora E. Fleming

This remarkable volume brings experts from diverse disciplines and builds a workable understanding of breadth and depth of the processes – both social and environmental – that will help us to limit future costs and enhance the benefits of sustainable marine systems. In particular, the authors have developed a shared view that the global coastal environment is under threat through intensified natural resource utilization, as well as changes to global climate and other environmental systems. All these changes contribute individually, but more importantly cumulatively, to higher risks for public health and to the global burden of disease.


This pioneering book will be of value to advanced undergraduate and postgraduate students taking courses in public health, environmental, economic, and policy fields. Additionally, the treatment of these complex systems is of essential value to the policy community responsible for these questions and to the broader audience for whom these issues are more directly connected to their own health and well-being.


*"The following pages in this volume are written in a lucid and very readable style, and provide a wealth of knowledge and insightful analysis, which is a rare amalgam of multi-disciplinary perspectives and unique lines of intellectual inquiry. It is valuable to get a volume such as this, which appeals as much to a non-specialist reader as it does to those who are specialists in the diverse but interconnected subjects covered in this volume."* From the "Forward" written by, R K Pachauri, Director General, TERI and Chairman, IPCC


Hardcover | 328 Pages | June 2014 | ISBN: 978-1-119-94131-6  
USD \$80.00 / £50.00 / €65.90

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# Europe – a maritime continent

- 4 seas & 2 oceans
- 91,000km coastline (EU + Norway)
  - **50% EU population lives within 50km of coastline**
  - 50% EU territory underwater
- Trade: **90% external, 40% internal**
  - 40% World's Merchant Fleet
- **5.4 M jobs**
- **GVA = €500 Billion/year**



# European Marine Board

Provides a pan-European platform for its member organizations to:

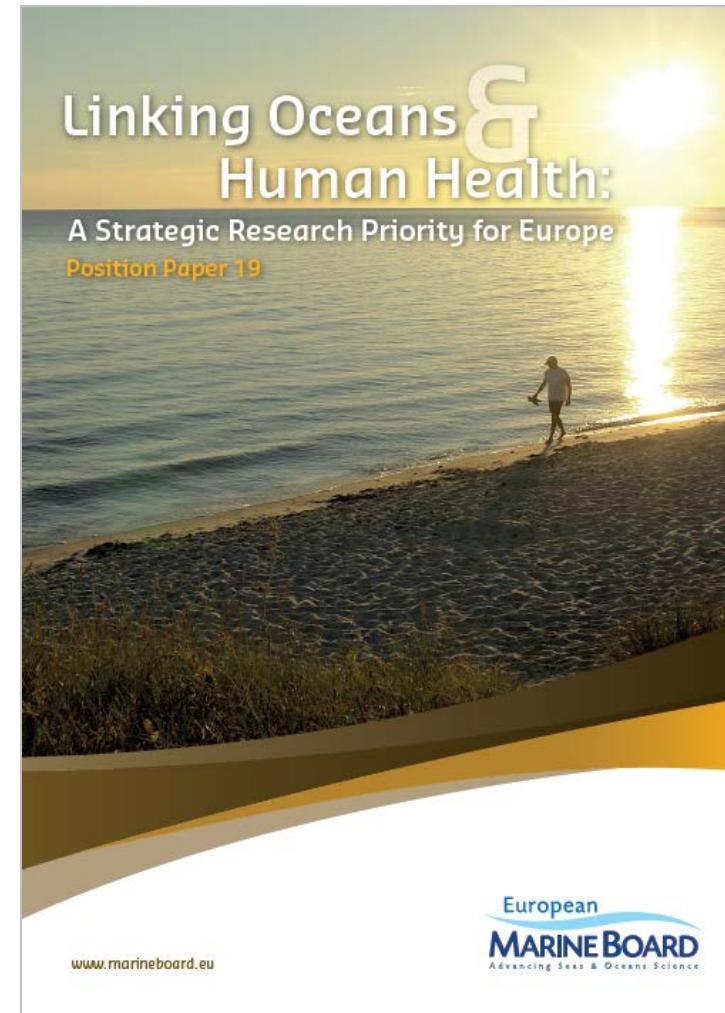
- **develop common priorities;**
- **advance marine research;**
- **bridge the gap between science and policy;**

to meet future marine science challenges and opportunities.



# 2014 OHH Recommendations

- Interdisciplinary collaboration
- Transmission processes
  - Ocean Literacy
- Valuation methods
- Causal relationships
- Monitoring and surveillance
- Indicators
- Environmental modelling



# Rome Declaration Goals+

## Oct 2014

“A coordinated, cross-disciplinary and integrated Programme on ***Oceans and Human Health***, targeted at understanding and managing the risks and benefits to human physical and mental wellbeing from interactions with the seas.”

- ***OHH Priority area*** for potential cooperation on Roadmap for Transatlantic Ocean Research Alliance.



# EU Blue Growth strategy: Risks & Benefits?

Goal to reach 7 million jobs by 2020 with 5 Sectors

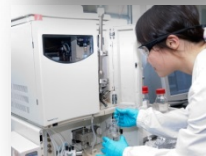
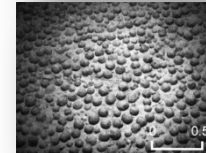
Blue energy

Aquaculture

Marine mineral resources

Maritime tourism

Marine biotechnology





# The Coast: An Under-researched Public Health Resource?



Mat White

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Michael Depledge



Sabine Pahl



Ben Wheeler

Ian Alcock, Debbie Cracknell, Karin Tanja-Dijkstra, Lewis Elliot, Bonny Hartley, Lora Fleming,  
Ian Frampton, Amanda Hignett, Rebecca Jenkin, Will Stahl-Timmins, Shanker  
Venkatasubramanian, Abigail Weeks, Kayleigh Wyles, Julie Hollenbeck, Cassie Phoenix





## Our tentative programme of research ...

Method	Pros (inc.)	Cons (inc.)	Our studies
<b>Systematic reviews</b>	Good handle on what's out there	Can exclude important information, no new evidence	- Attention Restoration Theory - Biodiversity & health
<b>Lab experiments</b>	Reduced confounds & selection effects. Increased understanding of underlying processes (e.g. physiological, emotional, cognitive).	Small Ns (convenience samples); non-ecological e.g. may miss synergistic effects	- Videos/photos/sounds - Attention processes - Delay of gratification - Risk taking - Pain
<b>Where people live</b>	Representative samples Some longitudinal data	Causality? Multiple confounders	- Census (N = 48 million) - BHPS (N = 12,000 x 18 yrs)
<b>Visitor surveys</b>	Big numbers / Multiple environments (controls) Voluntary/chosen	Memory biases, selection effects	- MENE (N = 142,000) - Wembury surveys - Surfing / sailing studies
<b>Field experiments</b>	Realistic exposure conditions with some control	Hard to randomise/blind to condition	- Marine Aquarium - Dental surgeries - Volunteering studies
<b>Imaging (fMRI)</b>	Observation of brain activity using blood flow proxy	Risk of Type 1 errors, "fishing trips", temporal snap-shots	- Urban/green/blue images - Matched liking sets
<b>Qualitative interviews</b>	In-depth understand of people's motives & beliefs	Unrepresentative samples Demand characteristics	- Parent interviews - Child interviews





# Choosing a hotel room.....

All 3 rooms are identical (2-3 star, size, furniture, ensuite, price) except view from the balcony

**A**



£60.81

**B**



£72.85

**C**



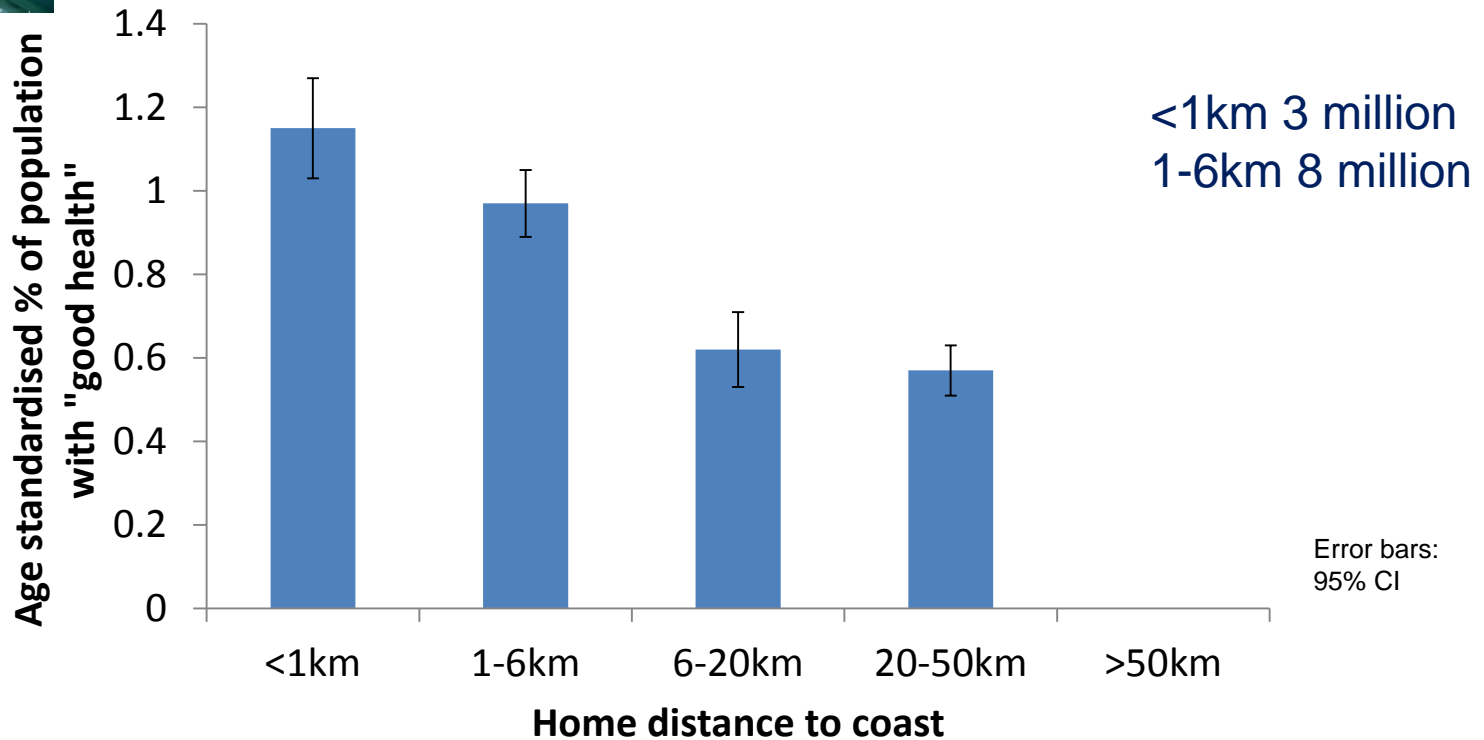
£47.96

**Mean Willingness to Pay (per night)**

White *et al.*, 2010, J Environ Psych



## Self-reported Health Census Data (England, n = 48 million)

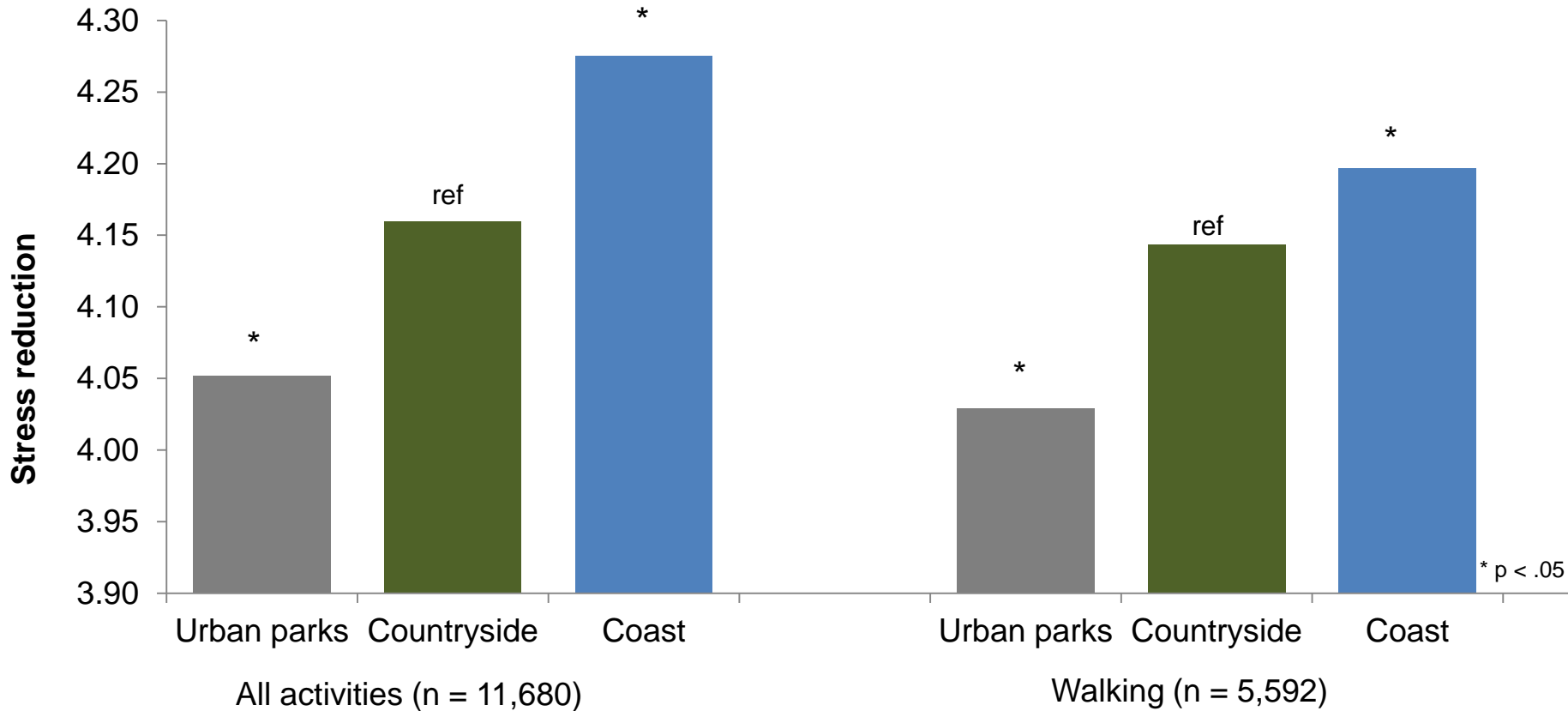


**- The effects are strongest in poorer communities**

Controlling for area Level: Income, Employment, Education, Crime,



## Monitor of Engagement with the Natural Environment (visits n = 11,680)



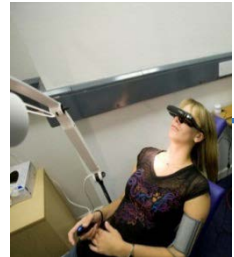
Controlling for: Age, gender, SES, activity type, visit duration, companions, distance travelled & mode of transport



## Randomised Control Trial

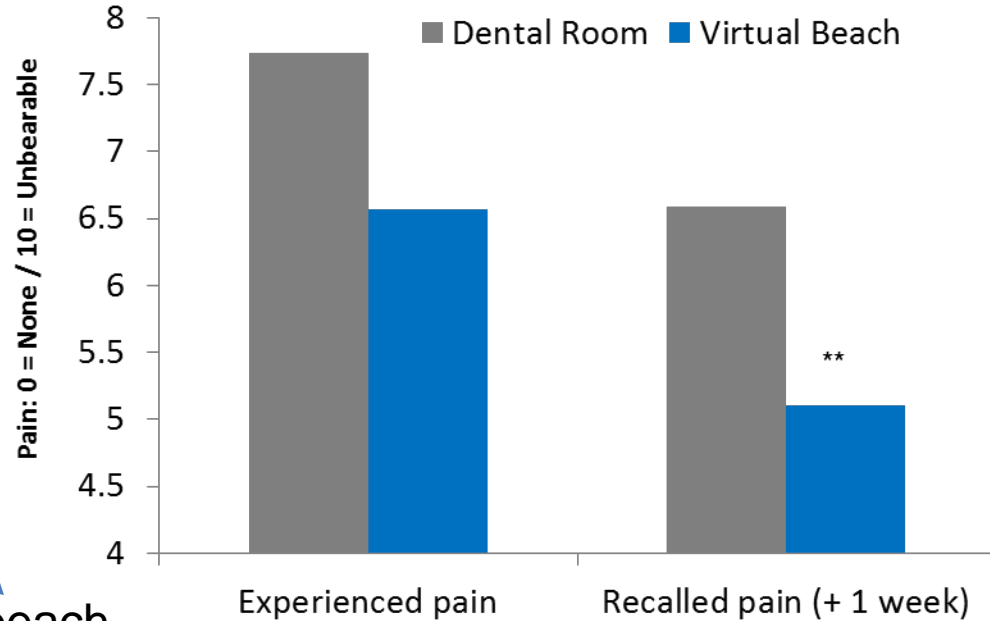


Dental room



Iced water

Virtual beach



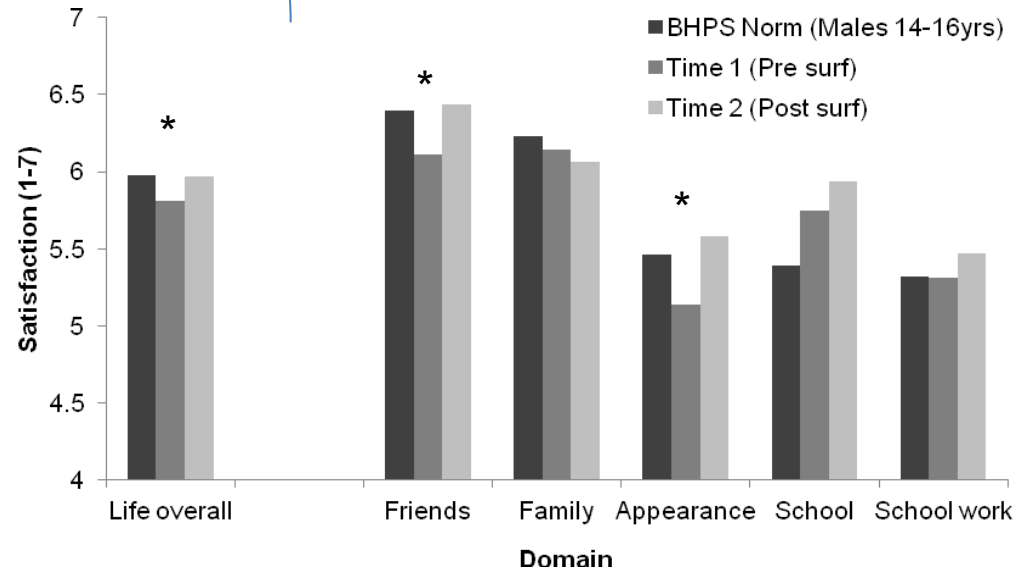
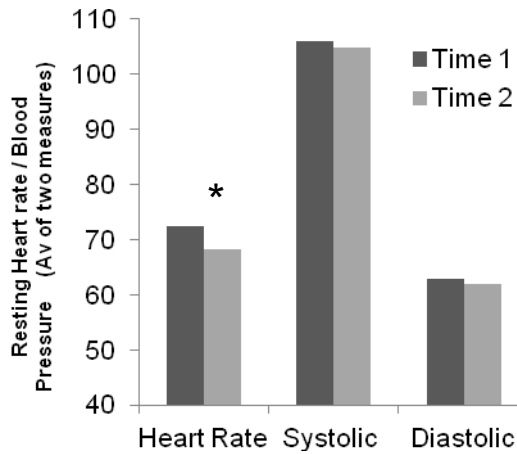
\* p < .05; \*\* p < .01

## Outcomes

- Pain
- Ease of treatment
- Keep appointments



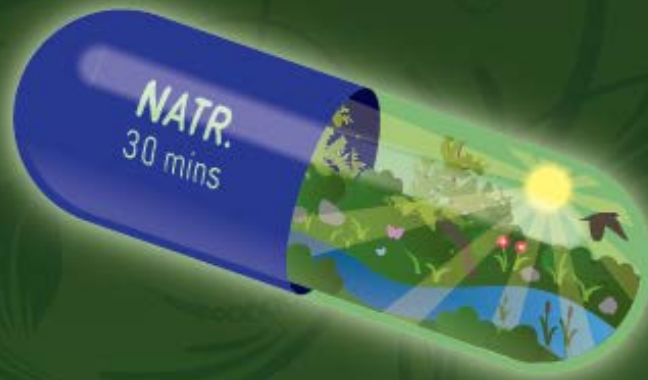
# Vulnerable Communities Business



# Next steps

- What is the optimal dose?
- How long do effects last?
- Comparisons to/Synergy with drugs (e.g. depression)?
- What about children, other vulnerable populations?
- Other countries?
- Environmental impacts?





# Salutogen<sup>©</sup>

- Lowers blood pressure
- Lowers heart rate
- Promotes wellbeing

Available from all parks, seashores,  
forests or countryside near you.

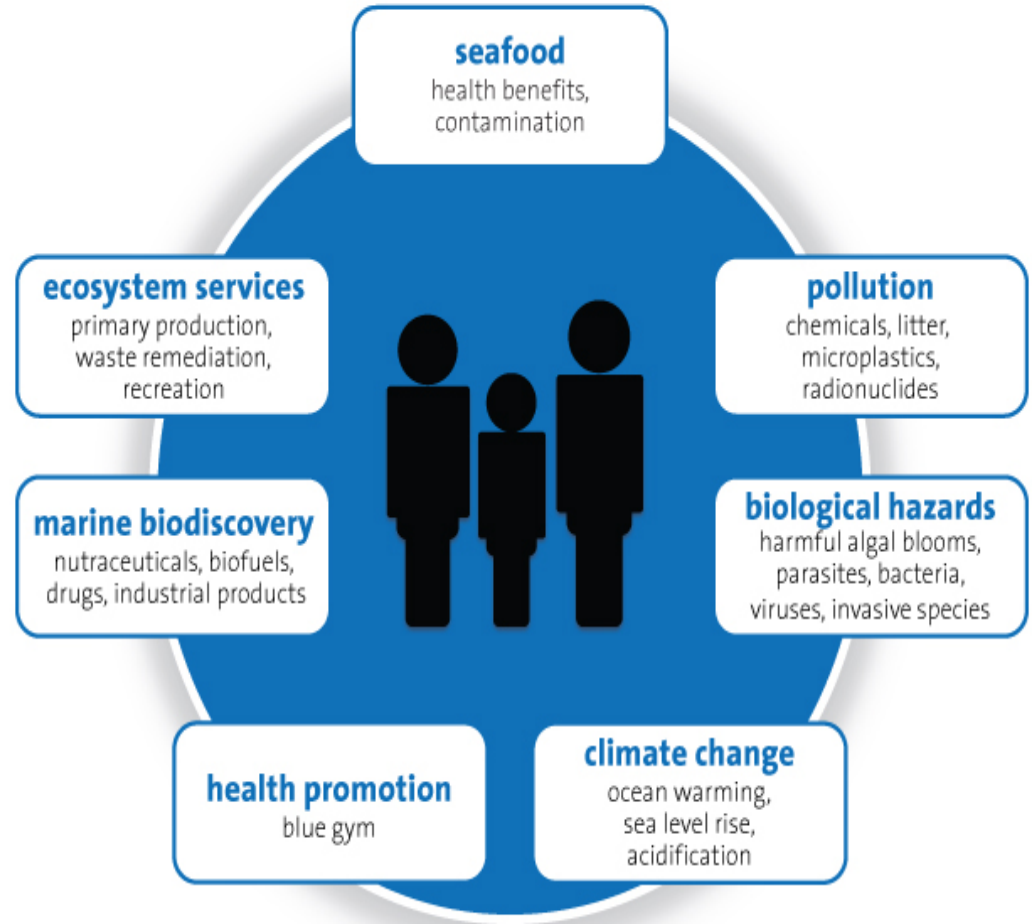
Dr Will Stahl-Timmins  
Prof Michael Depledge



European Centre for  
Environment & Human Health

# Interconnections between the Environment & Human Health

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**L.E.Fleming@Exeter.ac.uk**

