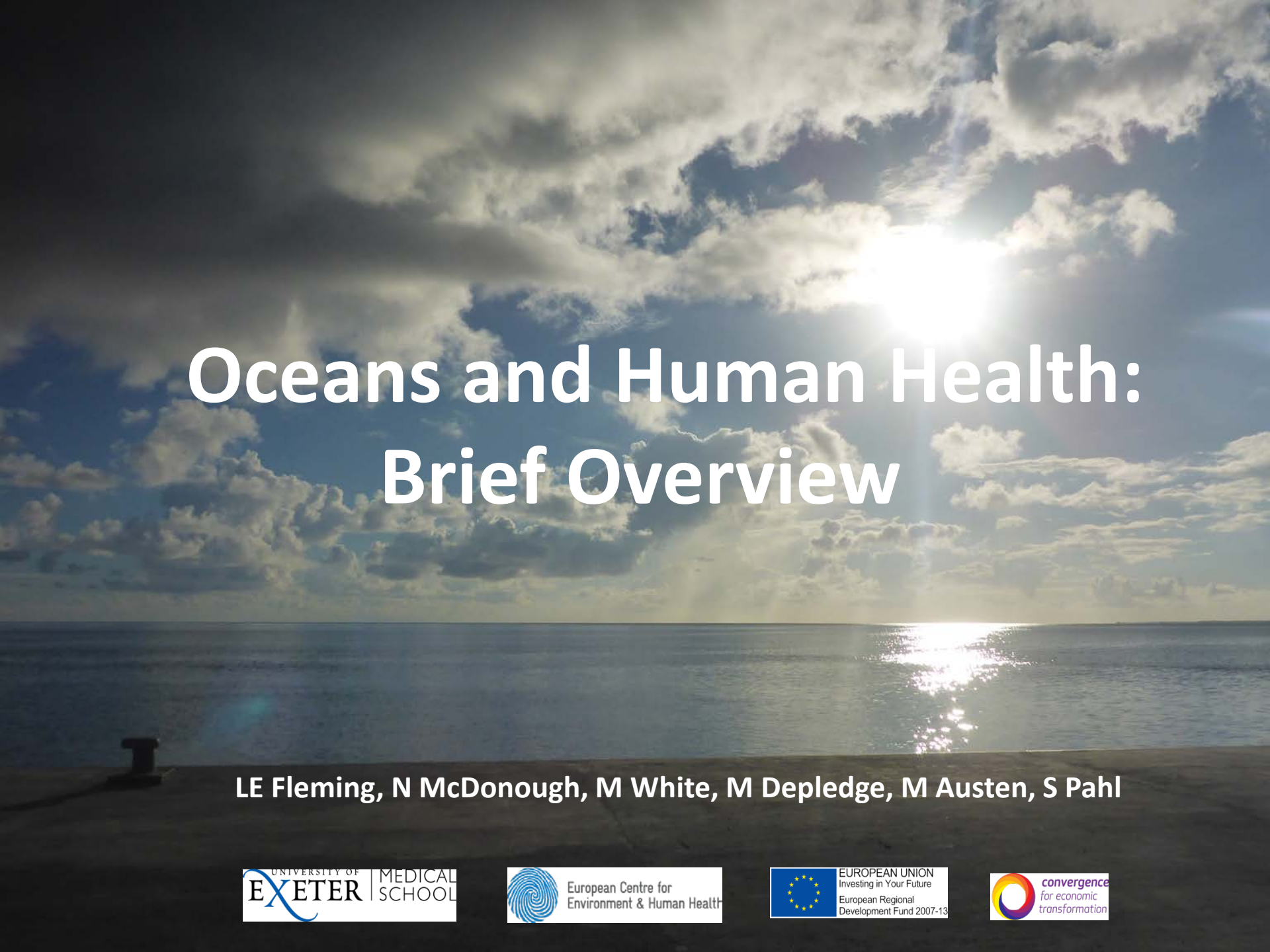


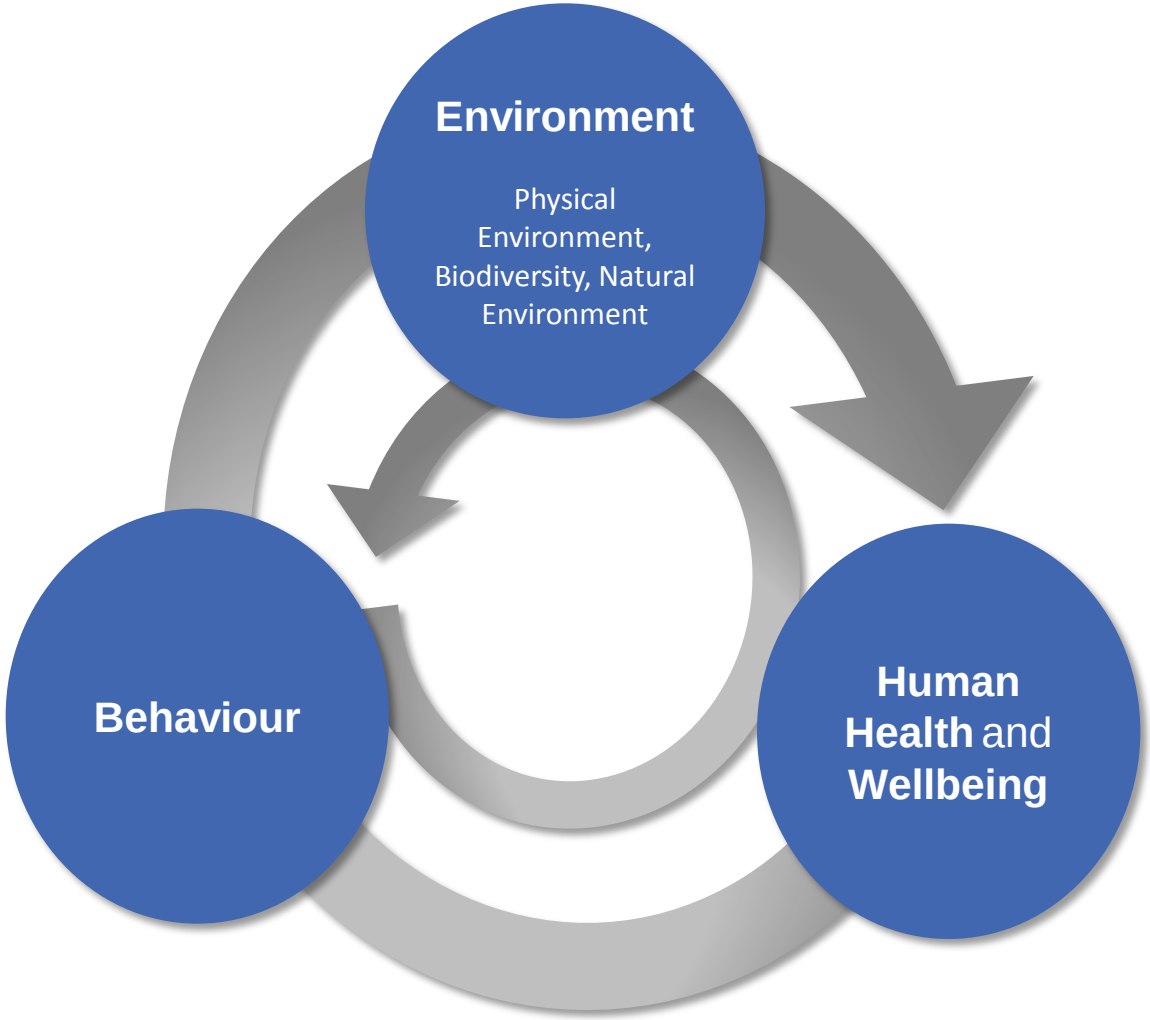
Oceans and Human Health: Brief Overview

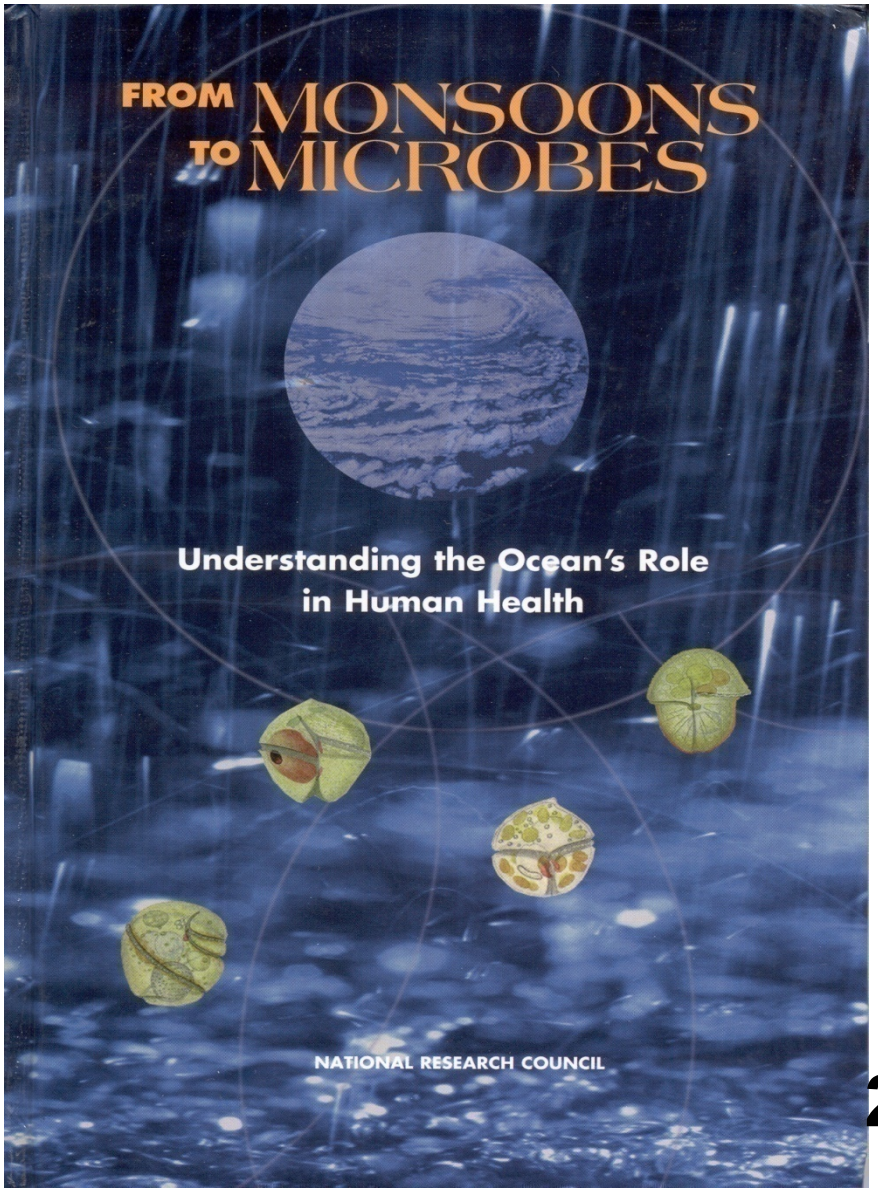
LE Fleming, N McDonough, M White, M Depledge, M Austen, S Pahl

University of Exeter Medical School
European Centre for Environment & Human Health
EUROPEAN UNION Investing in Your Future
European Regional Development Fund 2007-13
convergence for economic transformation

European Centre for Environment & Human Health

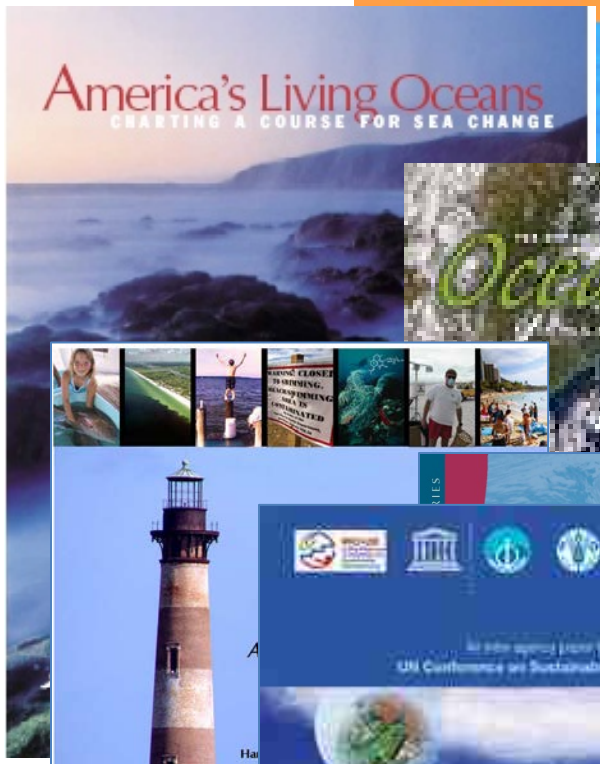
Interconnections: Environment ⟷ Human Health





1999

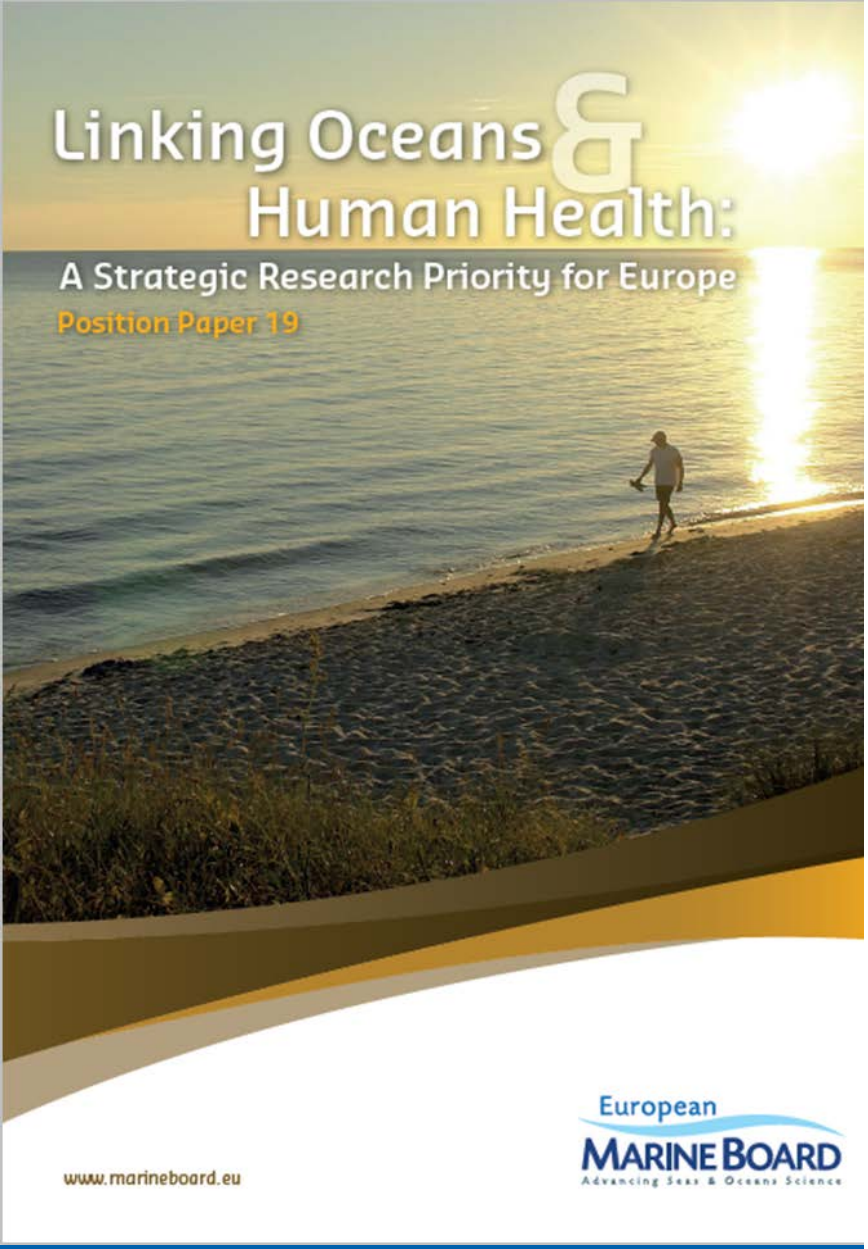
2005



2006

2007

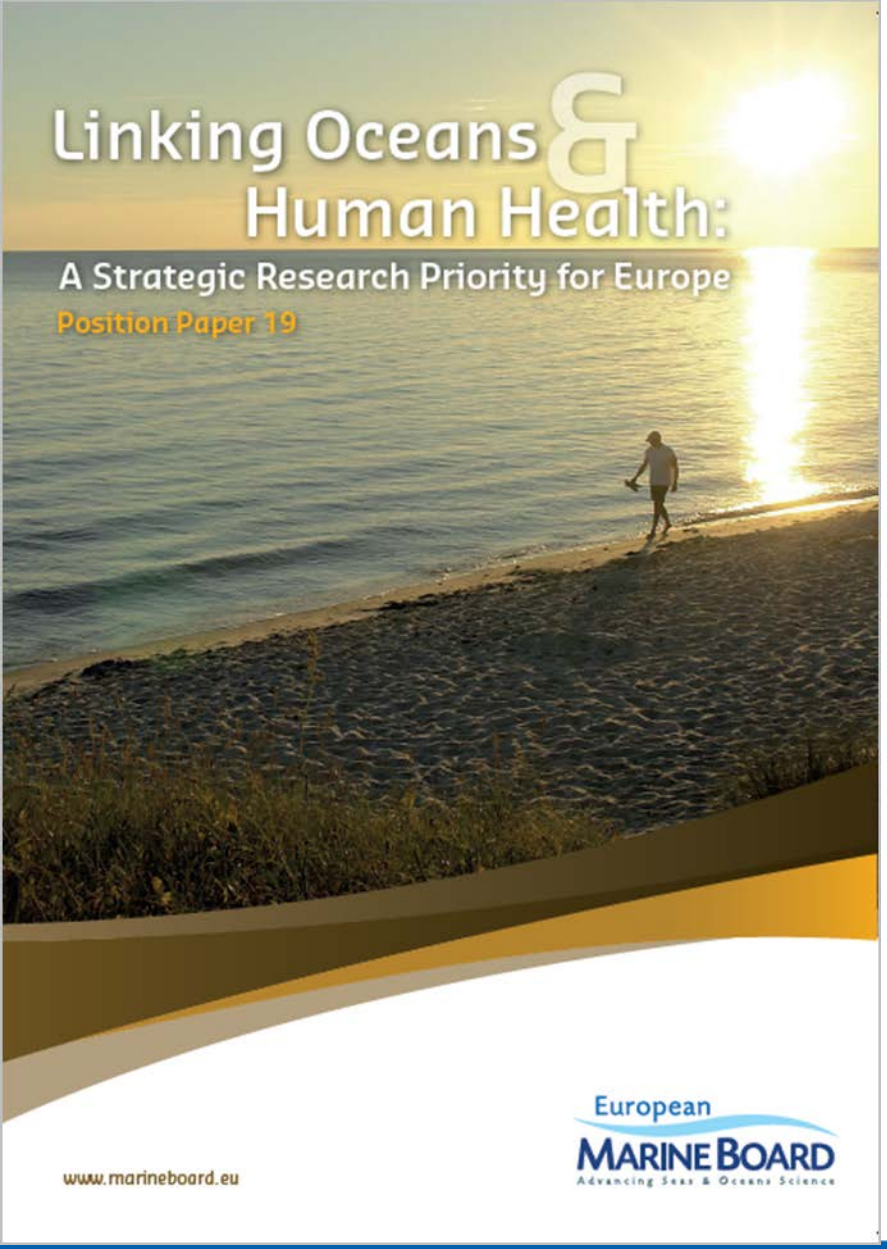
2012



International Need:

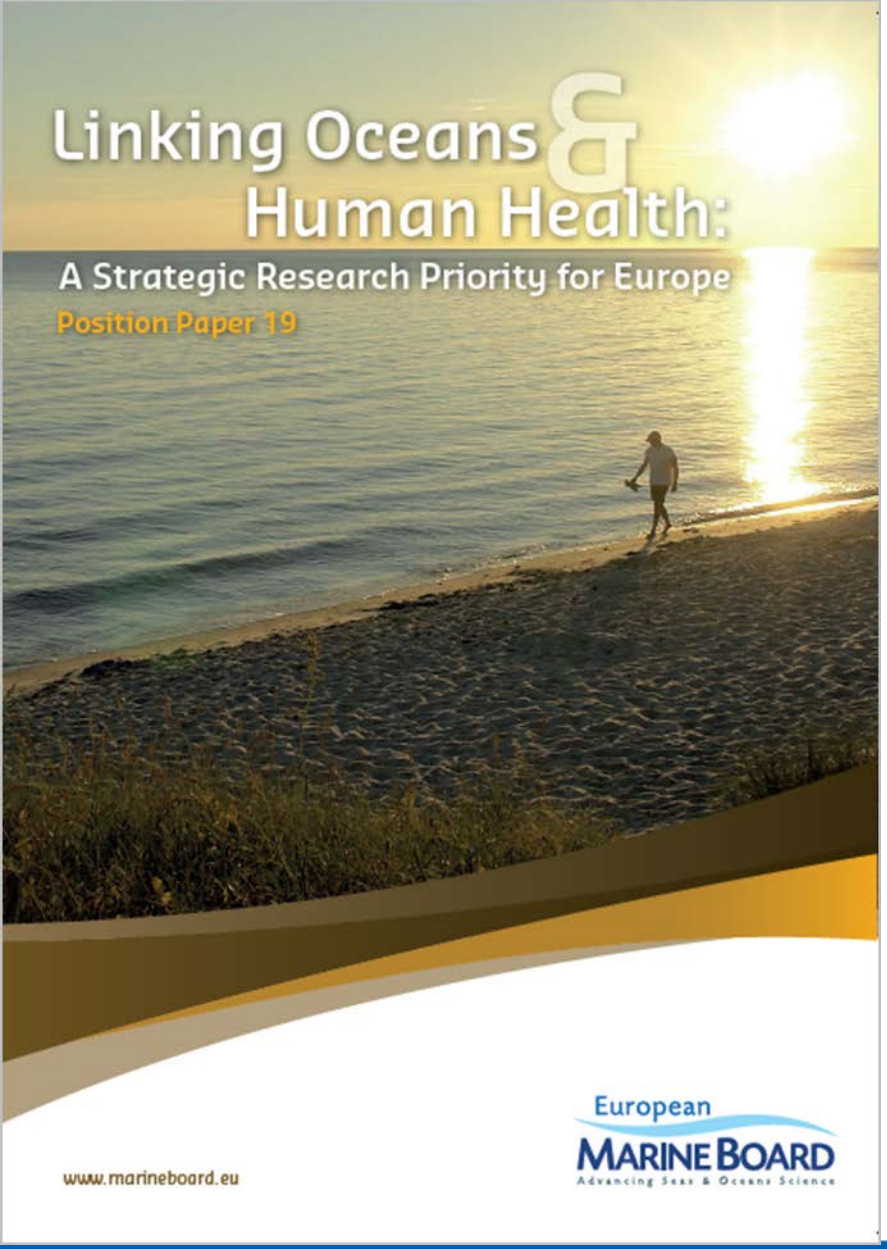
- **To Increase Understanding of Human and Ecosystem Interactions with the Seas and Oceans**

- **Both Risks AND Benefits/Opportunities**



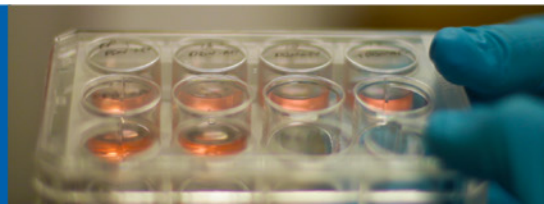
RISKS:

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



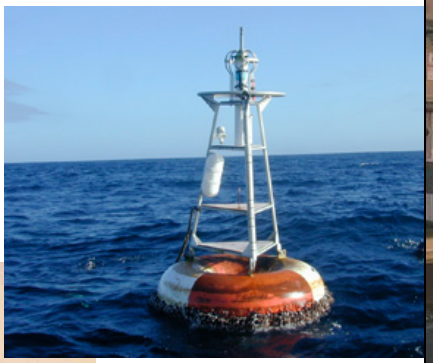
BENEFITS & OPPORTUNITIES:

- 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

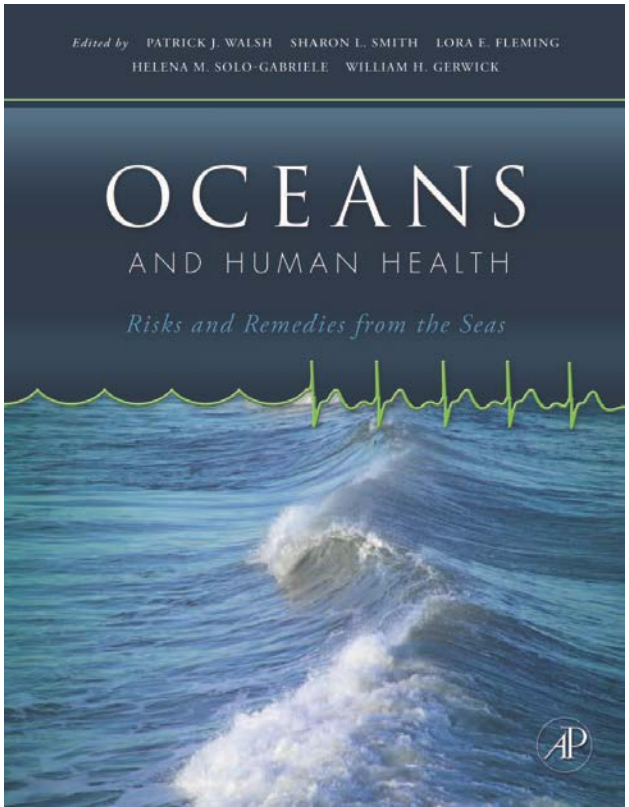
Gordon Research Conferences

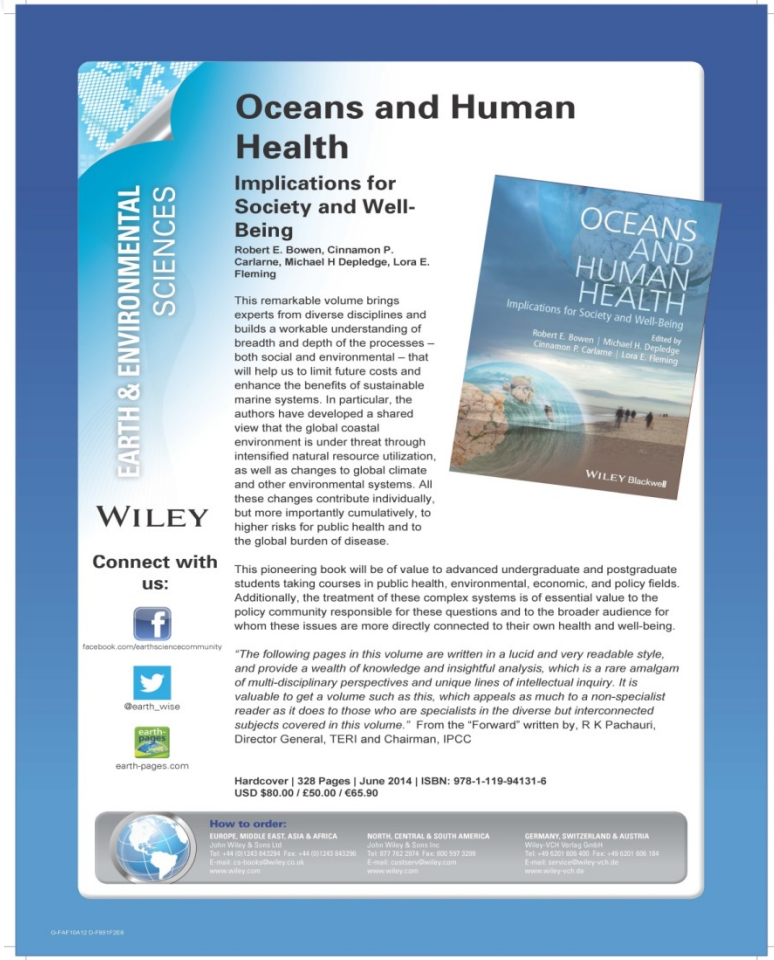
Frontiers of Science

Gordon Conference in

OCEANS & HUMAN HEALTH

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





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**

[1] EU Blue Growth Strategy: COM(2012)494 final; N McDonough ESF Marine Board

European Marine Board

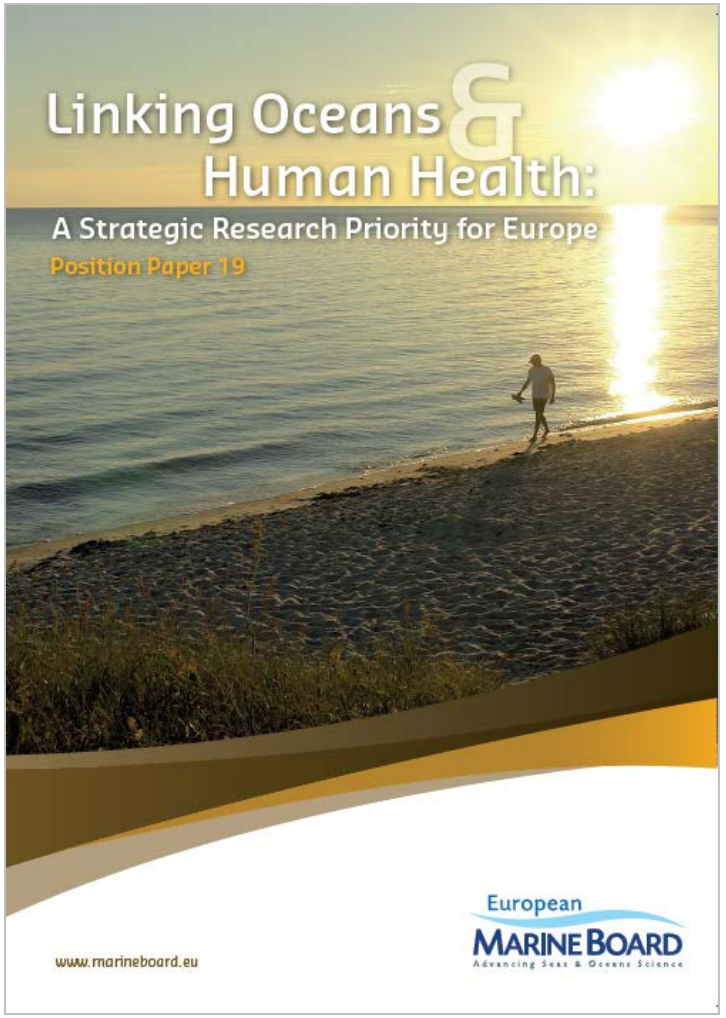
Provides a pan-European platform for its member organizations to:

- **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."

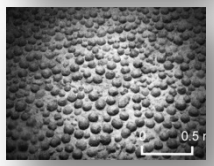
• ***OHH Priority area*** for potential cooperation on Roadmap for Transatlantic Ocean Research Alliance.

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





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The Coast: An Under-researched Public Health Resource?

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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

European Regional Development Fund Investing in your Future
convergence for economic transformation
University of Exeter Medical School
Research with Plymouth University
National Marine Aquarium

European Centre for Environment & Human Health

Our tentative programme of research …

Method	Pros (inc.)	Cons (inc.)	Our studies
Systematic reviews	Good handle on what's out there	Can exclude important information, no new evidence	-Attention RestorationTheory - Biodiversity & health
Lab experiments	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
Where people live	Representative samples Some longitudinal data	Causality? Multiple confounders	- Census (N = 48 million) - BHPS (N = 12,000 x 18 yrs)
Visitor surveys	Big numbers / Multiple environments (controls) Voluntary/chosen	Memory biases, selection effects	- MENE (N = 142,000) - Wembury surveys - Surfing / sailing studies
Field experiments	Realistic exposure conditions with some control	Hard to randomise/blind to condition	- Marine Aquarium - Dental surgeries - Volunteering studies
Imaging (fMRI)	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
Qualitative interviews	In-depth understand of people's motives & beliefs	Unrepresentative samples Demand characteristics	- Parent interviews - Child interviews

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Choosing a hotel room……

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

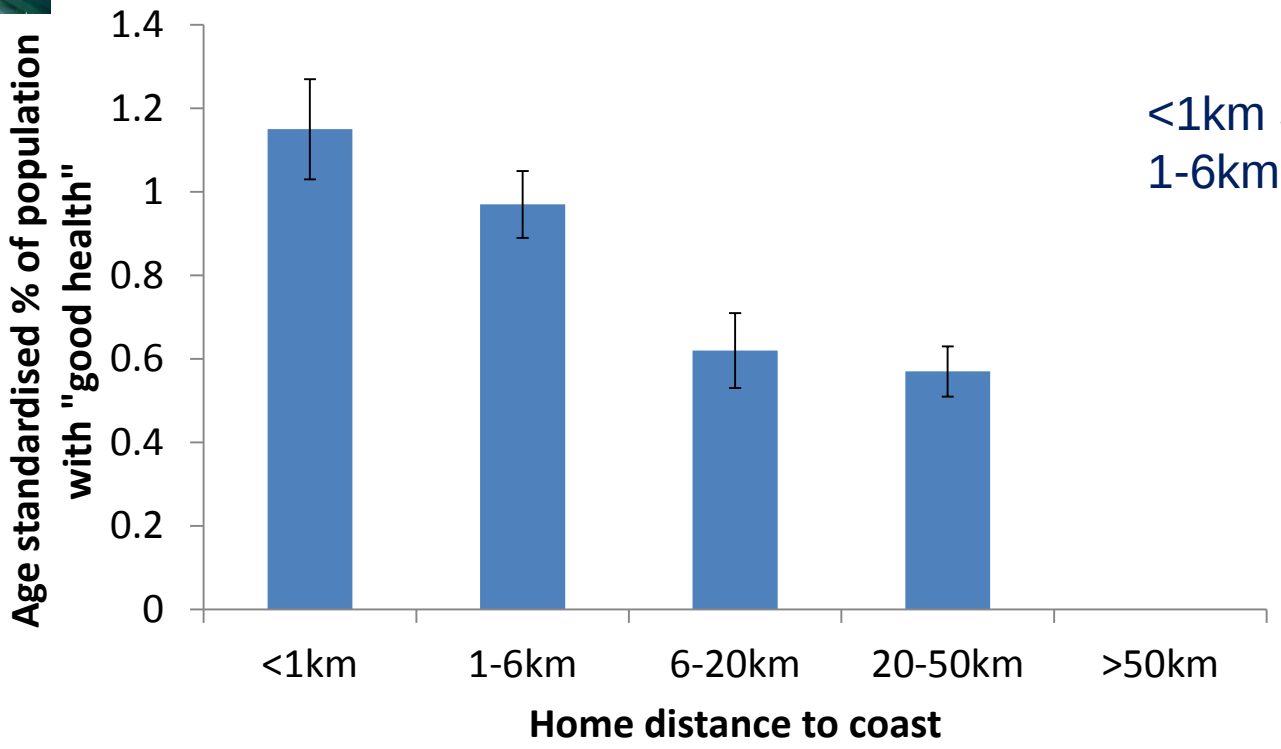
A	B	C
		
£60.81	£72.85	£47.96

Mean Willingness to Pay (per night)

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

Self-reported Health

Census Data (England, n = 48 million)



<1km 3 million
1-6km 8 million

Error bars:
95% CI

- The effects are strongest in poorer communities

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

Wheeler, White, Stahl-Timmins & Depledge (2012). Does living by the coast improve health and wellbeing? *Health & Place*, *18*, 1198-1201.

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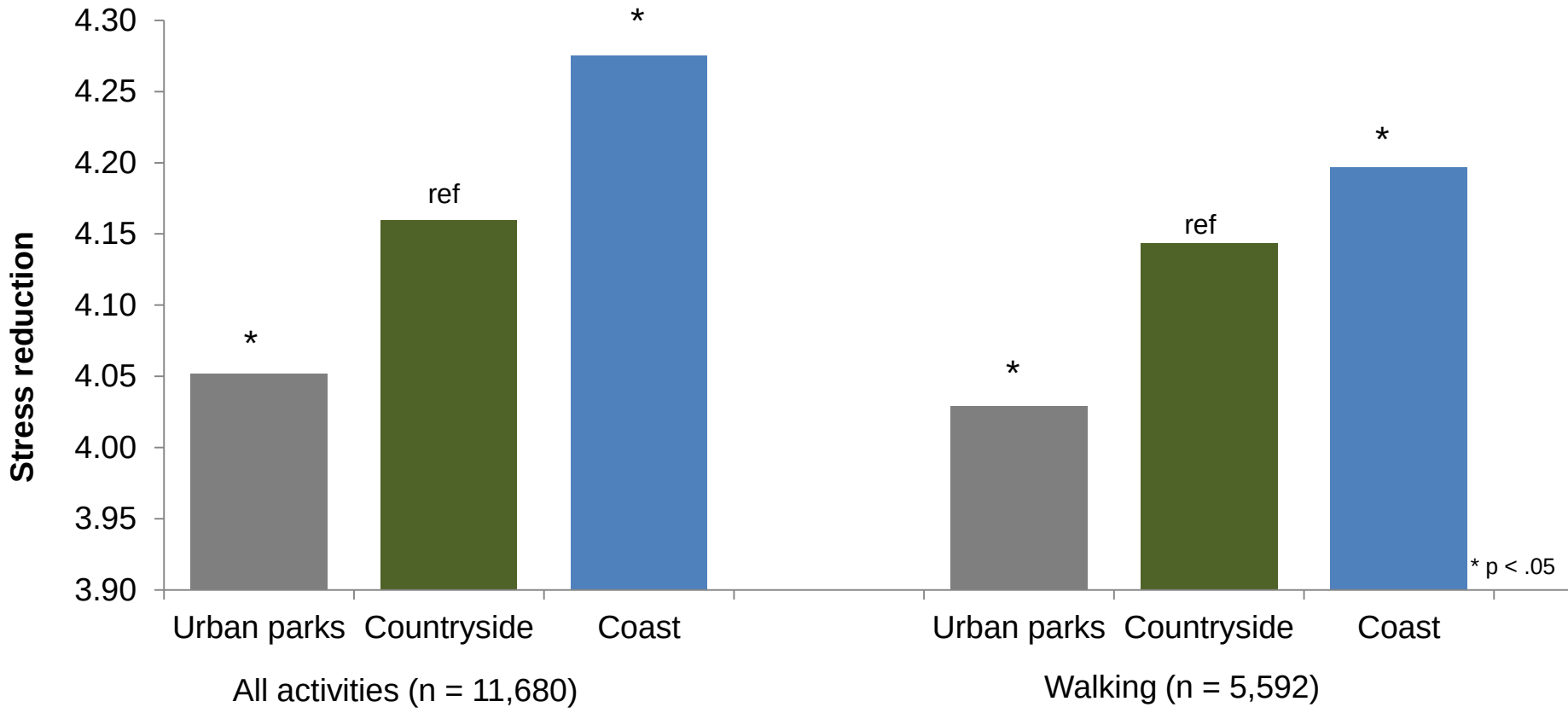
Stress reduction from coastal visits

NATURAL ENGLAND

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

White, M.P., Pahl, S. Ashbullby, K., Herbert, S.& Depledge, M.H. (2013). Restoration from recent nature visits. *Journal of Environmental Psychology*, *35*, 40-51.

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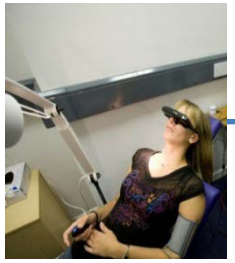
Bringing the sea into health care

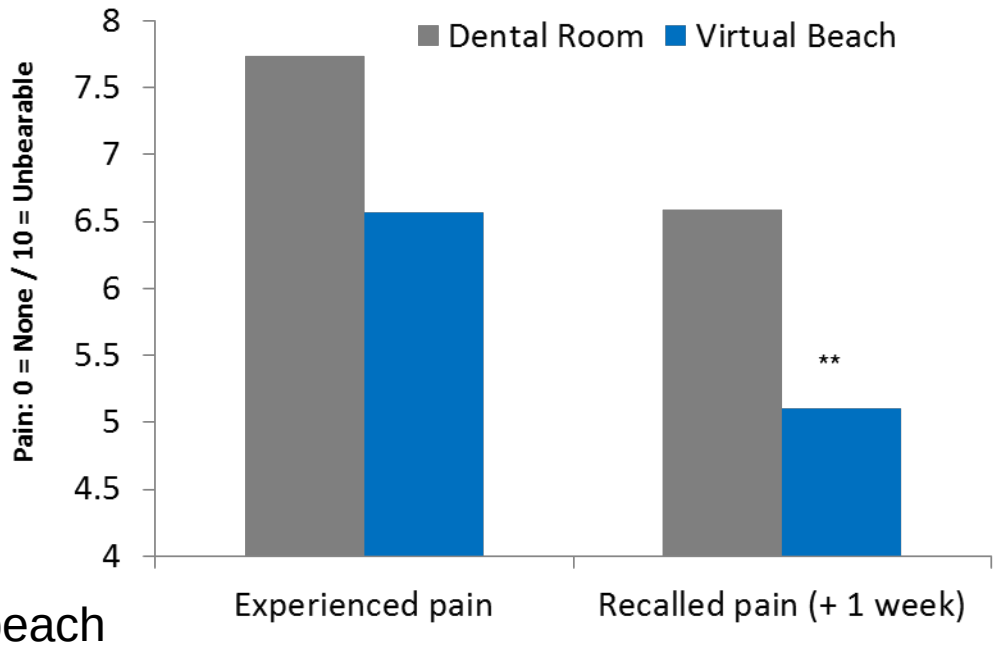
Randomised Control Trial

Dental room



Iced water

Virtual beach



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

Outcomes

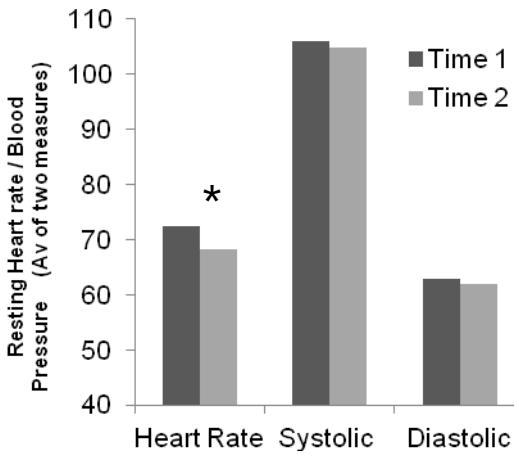
Pain

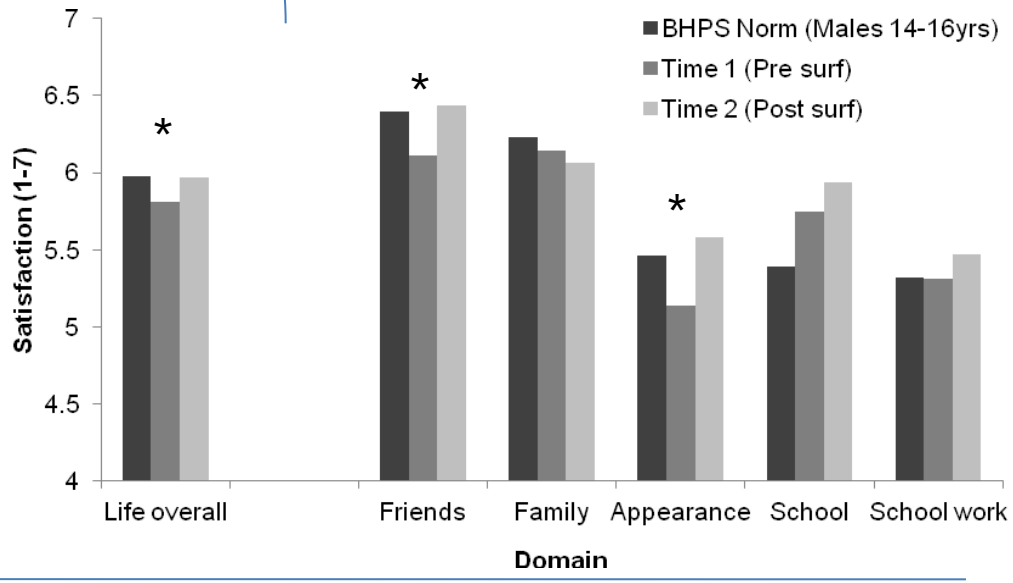
Ease of treatment

Keep appointments

Pahl, White et al

Vulnerable Communities Business

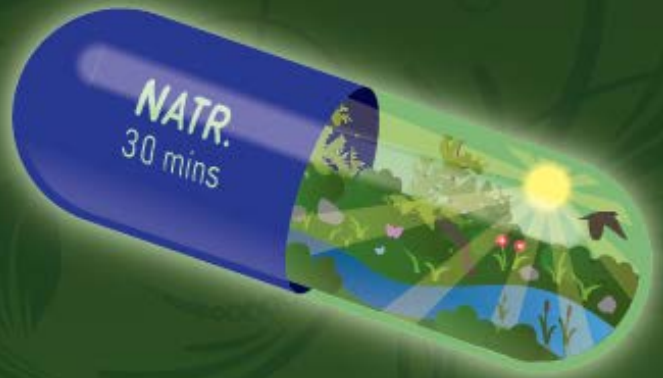




White, Hignett & Pahl (2012). *Surf to Success Outcomes: Can Learning to Surf Promote Individual and Environmental Well-Being?* Project Report for Ecominds.

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©

- Lowers blood pressure
- Lowers heart rate
- Promotes wellbeing

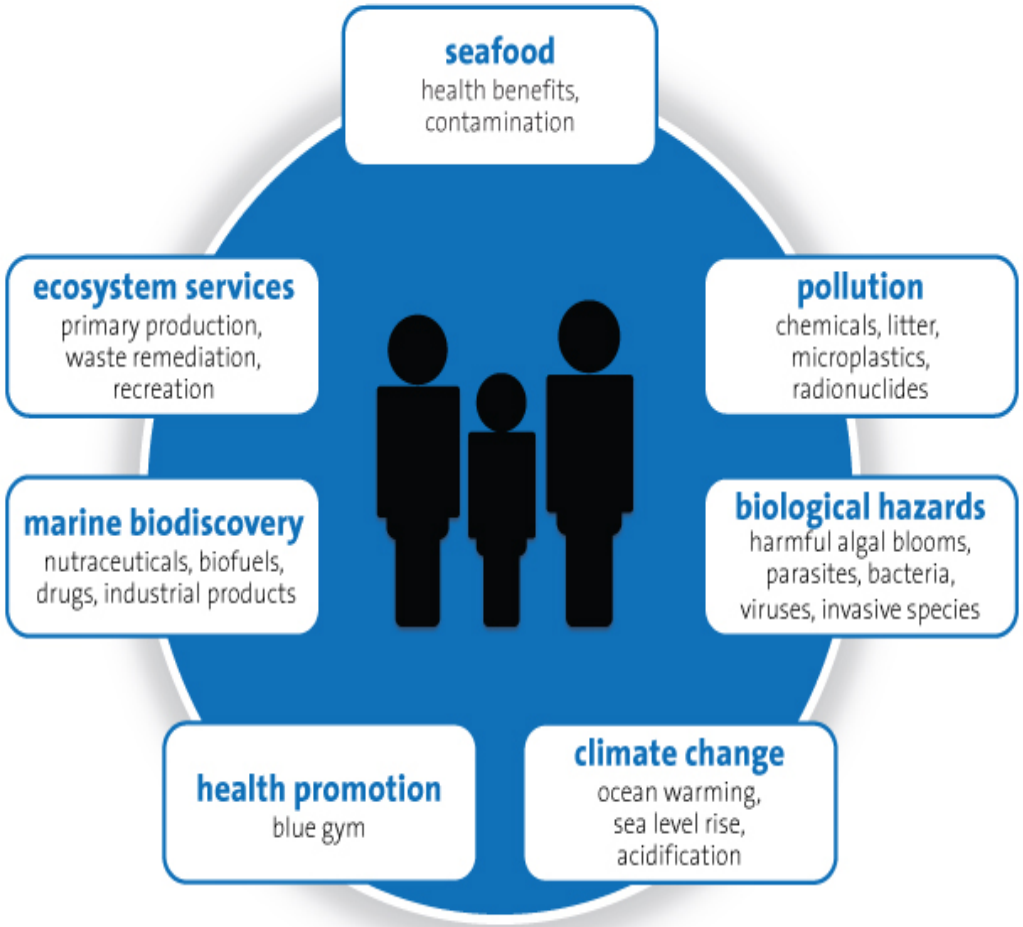
Available from all parks, seashores, forests or countryside near you.

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