The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

On the following pages, you will find:

- *Blue Mind* Introduction
- *Blue Mind* Statement
- Manifiesto de beneficios medicinales para una *Mente Azul* (Spanish Translation)
- Blue Mind: L'acqua può essere una medicina inesauribile per l'uomo (Italian Translation)
- *Blue Mind* Endorsements
- Selected *Blue Mind* Peer-Reviewed Research and Summaries
- Selected *Blue Mind* Books & Reports
- Why Endorse *Blue Mind*?
- *Blue Mind* Press & Media Kit
- Acknowledgments

Please download and share text, links, and images in any way that advances this conversation.

Use @GetBlueMind #bluemind on social media and link to www.getbluemind.com as well as images and video from the Press & Media Kit to share this statement. Feel free to use the Bluescription form wherever needed.

Contact us by email if you'd like to contribute a translation of this statement or have other ideas to expand its reach.

The theme of our 8th Annual Blue Mind Summit was "Water Is Medicine". It was held October 4th, 2018 in Miami, Florida at the Phillip & Patricia Frost Museum of Science. The theme of the 9th Annual Blue Mind Summit at the Esalen Institute in Big Sur, California was "Blue Mindfulness".

The 9th Annual 100 Days of #BlueMind Challenge began May 30th, 2022. Get safely near, in, on or under your wild, domestic, urban and virtual waters daily and share your stories together.

The 10th Annual Blue Mind Online Book Club will be held daily starting in January 2023. Come use the book club to learn, train their team in Blue Mind science and/or fall asleep. Get a book (you don't need one though), log on, listen in, and share your thoughts and questions.

You can fill out the *Blue Mind* Impact Survey here: https://goo.gl/forms/j5cRVxe3xJnePFoI3

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Dear Friends and Colleagues,

Many of us have personally experienced and/or witnessed the positive cognitive, emotional, psychological, social, physical, and spiritual impact our waters can have. In that light, we thought you would be interested in this effort.

A strong, diverse group of global leaders is emerging to change the conversation about the true value of our waters and oceans for good.

Please share this statement about the benefits of healthy waters for human health and well-being with nurses, therapists, doctors, psychologists, other health professionals, and associated researchers. The document supports health practitioners and their patients in integrating nature—specifically aquatic environments—in treatment plans, provides updates for use in conservation and restoration, and bolsters transdisciplinary communication and collaboration. The statement, a growing list of endorsers including (but not limited to) nurses, physicians, mental health professionals, neuroscientists, and many past presenters at the Annual *Blue Mind* Summits, and supporting literature can be found below.

Endorsements can be added directly as comments on the document or emailed to us here. This is an ongoing effort that was originally included as part of our commitment to the Our Ocean Conference held at the Department of State in Washington, D.C. on September 15-16, 2016. This is a living document and we continue to collect endorsements and integrate the latest scientific research as it emerges.

To endorse, include your full name, relevant information (affiliation is optional), and location. For example:

Paul K. Piff, PhD, Assistant Professor of Psychology & Social Behavior, University of California, Irvine, CA, USA
Molly Steinwald, MS, Executive Director, Environmental Learning Center, Vero Beach, FL, USA
Andrew Stern, MD, Associate Professor of Neurology, University of Rochester School of Medicine, NY, USA

The statement, endorsements and relevant literature are shared here and on our website for all to circulate.

Just as health practitioners include exercise, a good diet, sleep, music, relaxation, yoga, and — increasingly — nature in their therapy toolkit, they now have peer-reviewed research to support a prescription for regularly scheduled time near, in, on, and under healthy wild, domestic, urban, and virtual waters.

As science, environmental, and outdoor educators teach students about the importance of ecological, economic, and cultural diversity, they can also include emotional diversity in their programs, lessons, and curricula.

Our hope is that doing so will help reverse the under-valuing of waters and oceans; expand this important conversation to new sectors; improve access to and practice of effective, non-invasive *Blue Mind* therapies; inspire deeper lifelong connections to natural areas; and build wider support for the actions and policies that drive wellness and restoration.

Thank you.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

The Blue Mind **Movement**

Our waters and oceans provide vast cognitive, emotional, physical, psychological, social, and spiritual values and benefits for people from birth, through adolescence, adulthood, older age, and end of life stages. Wild, domestic, urban, and virtual waters provide a useful, widely available, and affordable range of treatments healthcare practitioners can incorporate into treatment plans.

The world ocean and all waterways, including lakes, rivers, and wetlands (collectively, blue space), cover over 71% of our planet. Keeping them healthy, clean, accessible, and biodiverse is critical to human health and well-being.

In addition to fostering more widely documented ecological, economic, and cultural diversities, our mental well-being, emotional diversity, and resiliency also rely on the global ecological integrity of all waters.

Blue space gives us over half of our oxygen, provides billions of people with jobs and food, holds the majority of Earth's biodiversity including species and ecosystems, drives climate and weather, regulates temperature, and is the sole source of hydration and hygiene for humanity throughout history.

Neuroscientists and psychologists add that waters and oceans are a wellspring of happiness and relaxation, sociality and romance, peace and freedom, play and creativity, learning and memory, innovation and insight, elation and nostalgia, confidence and solitude, wonder and awe, empathy and compassion, reverence and beauty — and help manage trauma, anxiety, sleep, autism, addiction, fitness, attention/focus, stress, grief, PTSD, build personal resilience, and much more.

Chronic stress and anxiety cause or intensify a range of physical and mental afflictions, including depression, ulcers, colitis, heart disease, and more. Unchecked, this "red mind" mode, leads to burn-out. Being on, in, and near water can be among the most cost-effective ways of reducing stress and anxiety.

We encourage healthcare professionals and advocates for the ocean, seas, lakes, and rivers to go deeper and incorporate the latest findings, research, and insights into their treatment plans, communications, reports, mission statements, strategies, grant proposals, media, exhibits, keynotes, and educational programs and to consider the following simple talking points:

- Water is the essence of life: The ocean, healthy rivers, lakes, and wetlands are good for our minds and bodies.
- Research shows that nature is therapeutic, promotes general health and well-being, and blue space in urban, rural, and virtual settings further enhances and broadens cognitive, emotional, psychological, social, physical, and spiritual benefits.
- All people should have safe access to salubrious, wild, biodiverse waters for well-being, healing, and therapy.
- Aquatic biodiversity has been directly correlated with the therapeutic potency of blue space. Immersive human interactions with healthy aquatic ecosystems can benefit both.
- Wild, domestic, urban, and virtual waters can serve as medicine for caregivers, patient families, and all who are part of patients' circles of support.

- Realization of the full range and potential magnitude of ecological, economic, physical, intrinsic, and emotional values of wild places requires us to understand, appreciate, maintain, and improve the integrity and purity of one of our most vital of medicines — water.

Blue Mind activities include (but are not limited to) safe and supervised participation in swimming, board sports, floating, soaking, diving, boating, voyaging, fishing, paddling, interacting, beach and coast walks, wildlife watching, and other blue space activities as best practices for health and wellness.

Extending this conversation to new sectors, constituencies, and areas of research and educating the public about the true value of healthy, wild waters is of utmost priority.

As NASA scientists search the universe they use a simple mantra "Follow The Water." It is the source, matrix, and sustenance of all known life.

Healthy waters also enhance our quality of life in many important ways.

A more complete understanding of the full value of the aquatic environment will build a stronger, deeper, wider, and enduring *Blue Mind* movement and underline the importance of restoration, conservation, and protection efforts.

By improving education about the health benefits of water, providing adequate safety and skills training, and improving access for all communities, healthy waters and oceans can be lifelong medicine for all people.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Manifiesto de beneficios medicinales para una *Mente Azul*: Las aguas naturales pueden ser la medicina vital para todo

Las aguas salvajes o naturales de nuestro mundo proporcionan grandes beneficios cognitivos, emocionales, físicos, psicológicos, sociales y espirituales para todos los seres humanos. .

Desde el nacimiento, pasando por la adolescencia, la edad adulta, la vejez, y hasta la muerte, las aguas naturales ofrecen una gama de tratamientos útiles y a nuestro alcance, por lo cual los médicos profesionales pueden incorporarlas en sus planes de tratamiento.

Los océanos del mundo y las corrientes de agua, incluyendo lagos, ríos y pantanos (colectivamente todo el espacio azul), cubren más del 71% de nuestro planeta. Mantenerlos sanos, limpios, accesibles y biodiversos es fundamental para la salud y el bienestar de la humanidad.

Nuestro bienestar mental, y nuestra diversidad y resiliencia emocionales también dependen de la integridad ecológica global de nuestras aguas – además de fomentar otras diversidades ecológicas, económicas y culturales más ampliamente documentadas.

El espacio azul provee la mitad de nuestro oxígeno, proporciona puestos de trabajo y comida para miles de millones de personas, contiene la mayor parte de la biodiversidad del planeta, tanto en especies como en ecosistemas, determina el clima y el tiempo, regula la temperatura, y ha sido la única fuente de hidratación e higiene para la humanidad a lo largo de la historia.

Los neurocientíficos y los psicólogos añaden que el mar y las vías navegables salvajes son fuentes de felicidad y relajación, de sociabilidad y de romance, de paz y libertad, de juego y creatividad, de aprendizaje y memoria, de innovación y perspicacia, de euforia y nostalgia, de confianza y soledad, de maravilla y asombro, de empatía y compasión, de reverencia y belleza – y ayudan a gestionar los traumas, la ansiedad, del sueño, el autismo, las adicciones, la forma física, la atención y concentración, el estrés, el dolor, el trastorno de estrés postraumático, aumentan la resiliencia personal, y mucho más.

El estrés crónico y la ansiedad causan o intensifican toda una serie de dolencias físicas y mentales, como la depresión, las úlceras, la colitis, enfermedades cardiovasculares, y otras. Estar sobre, dentro o cerca del agua puede ser una de las maneras más económicas de reducir el estrés y la ansiedad.

Animamos a los profesionales sanitarios y a los defensores de los océanos, mares, lagos y ríos a desarrollar un análisis e ir más profundo en sus investigaciones para incorporar los últimos descubrimientos, y pesquisas en sus planes de tratamiento, comunicaciones, informes, principios organizativos, estrategias, propuestas de subvención, material audiovisual, exposiciones, charlas, y programas educativos: y sería ideal que tengan en cuenta los siguientes argumentos:

- El agua es la esencia de la vida: el mantener los océanos, ríos, lagos y humedales sanos es esencial para nuestros cuerpos y mentes.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

- La investigación científica muestra que la naturaleza es terapéutica, y promueve la salud general y el bienestar, también que el espacio azul, tanto en zonas urbanas como rurales, contiene beneficios cognitivos, emocionales, psicológicos, sociales, físicos y espirituales.

- Todas las personas deben tener acceso seguro a las aguas sanas, salvaje y biodiversas para mantener un nivel de bienestar activo, y acelerar el proceso de una curación o una terapia.

- La biodiversidad acuática ha correlacionado directamente con la potencia terapéutica que provee el espacio azul. Las interacciones humanas inmersivas con los ecosistemas acuáticos sanos pueden beneficiar a ambos.

- Las aguas salvajes pueden servir como medicina para ayudantes de cualquier servicio, familiares de pacientes, y todas las personas que se encuentran en el círculo de apoyo de un paciente. .

- Para aprovechar la magnitud potencial de toda la gama de beneficios ecológicos, económicos, físicos, intrínsecos, y emocionales de los lugares salvajes, debemos entender, apreciar, mantener y mejorar la integridad y la pureza de una de las medicinas más esenciales: el agua.

La Medicina que provee la *Mente Azul* incluye (pero no se limita a) las siguientes actividades como prácticas recomendadas para la salud y el bienestar: la natación, deportes de tabla, flotar, bañarse, bucear, pasear en bote, viajar por mar, pescar, remar, interactuar, caminatas por la playa y la costa, observación de animales salvajes, y otras actividades en el espacio azul.

Es de máxima prioridad extender esta conversación a varios sectores, grupos y áreas de investigación, así como educar al público sobre el verdadero valor de las aguas sanas y salvajes.

Los científicos de la NASA que buscan vida en el universo utilizan una simple mantra: “sigue el agua”, como fuente, matriz y sustento de toda vida conocida.

Las aguas sanas también mejoran nuestra calidad de vida en muchos aspectos importantes.

Una comprensión más completa de la totalidad del valor del medio ambiente acuático hará más fuerte, más profundo, más amplio, y perdurable el movimiento de la *Mente Azul*, subrayando la importancia de los esfuerzos de restauración, conservación y protección.

Si mejoramos la educación sobre los beneficios del agua para la salud y facilitamos el acceso para todas las comunidades, el océano y las vías fluviales salvajes podrán ser una medicina vital para todos.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Blue Mind: L'acqua può essere una medicina inesauribile per l'uomo
Blue Mind - Dichiarazione

Gli oceani, come tutte le acque, sono per gli esseri viventi un valore cognitivo, emotivo, fisico, psicologico, sociale e spirituale fondamentale. Un valore che si esprime dalla nascita alla morte, passando per l'adolescenza, l'età adulta e la senilità.

Le acque libere, ampiamente disponibili, sono un'utile cura per una vasta gamma di problematiche che gli operatori del benessere possono integrare nei trattamenti offerti e proporre all'interno dei propri metodi di cura.

Gli oceani e tutti i corsi d'acqua come laghi, fiumi e zone umide (definiti come "Spazio Blu") coprono nel loro insieme più del 71% del nostro Pianeta. Conservarli sani, puliti, accessibili e ricchi di biodiversità è fondamentale per la salute ed il benessere dell'umanità.

Oltre a promuovere un'ampia e documentata diversità ecologica, economica e culturale, è risaputo che anche il nostro benessere mentale, la nostra diversità emotiva e la nostra resilienza fanno affidamento sull'integrità globale di tutte le acque.

Lo "Spazio Blu" fornisce infatti più della metà dell'ossigeno di cui abbiamo bisogno per vivere; offre lavoro e cibo a milioni di persone e contiene la maggior parte della biodiversità della Terra, come gli ecosistemi e le specie animali e vegetali. Influenza inoltre il clima e il tempo atmosferico, regola la temperatura ed è stato la sola fonte di idratazione ed igiene per l'umanità per gran parte della Storia.

Neuroscienziati e psicologi aggiungono che le acque e gli oceani sono fonte di felicità e relax, socialità e romanticismo, pace e libertà. Ma sono anche gioco e creatività, apprendimento e memoria, innovazione e intuizione, euforia e nostalgia, fiducia e solitudine, meraviglia e timore, empatia e compassione, riverenza e bellezza... l'acqua è un valido aiuto nella gestione di traumi, ansia, sonno, autismo, dipendenze, stress, dolore, disturbi dell'attenzione, disturbi da stress post traumatico e nel fortificare la resilienza personale. Ma è molto altro ancora.

Lo stress cronico e gli stati di ansia causano o intensificano una serie di problemi fisici e psicologici fra cui depressione, ulcera, colite, malattie cardiache e altre patologie. Questo stato, chiamato anche "Red Mind" (Mente Rossa), può portare fino all'esaurimento. Essere vicino, sopra, sotto o nell'acqua è uno dei metodi più efficaci e convenienti per ridurre stress e ansia.

Invitiamo dunque i professionisti del settore sanitario e i sostenitori delle campagne per la salvaguardia degli oceani, dei mari, dei laghi e dei fiumi ad approfondire ed aggiornare le proprie conoscenze con le ultime scoperte scientifiche sulle proprietà terapeutiche dell'acqua e ad integrare nei piani curativi, nelle campagne di sensibilizzazione, nelle strategie di comunicazione, nelle mostre e nei programmi educativi, prendendo in considerazione questi semplici argomenti:

- L'acqua è l'essenza della vita: gli oceani, i corsi d'acqua salubri, i laghi e le zone umide sono importanti per il benessere del nostro corpo e della nostra mente.
- La ricerca dimostra che la natura è terapeutica e promuove la salute ed il benessere generale dell'individuo. Lo "Spazio Blu", sia in ambienti urbani che rurali, amplia e migliora ulteriormente le prestazioni sociali, emozionali, psicologiche, cognitive, fisiche e spirituali.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

- Tutte le persone dovrebbero avere la possibilità di accedere in modo sicuro ad acque salubri, libere e ricche di biodiversità per il proprio benessere, il mantenimento di un buono stato di salute e la terapia.
- La biodiversità acquatica è direttamente correlata alla “potenza terapeutica” dello Spazio Blu. Le relazioni umane che coinvolgono gli ecosistemi acquatici possono portare benefici ad entrambi.
- Le acque libere e incontaminate possono essere una vera e propria medicina per gli operatori sanitari, le famiglie delle persone malate e per tutti coloro che sono vicini e sostengono i pazienti.
- Per apprezzare appieno la potenzialità dell’insieme dei valori ecologici, economici, fisici ed emozionali intrinseci nei luoghi selvaggi ed incontaminati, dobbiamo capire, conservare e migliorare l’integrità e la purezza di una delle medicine più importanti e potenti che abbiamo a disposizione – l’acqua.

La *Blue Mind* comprende (ma non è solo limitata a questo) la pratica, in sicurezza, degli sport acquatici come nuotare, pescare, surfare, immergersi, pagaiare... ma anche semplicemente galleggiare, fare passeggiate sulla spiaggia e osservare la natura. Le attività nello “Spazio Blu” sono il miglior modo per mantenersi in salute e alimentare il proprio benessere.

Per questo è della massima priorità diffondere e far comprendere questo messaggio a nuovi settori ed aree di ricerca ed educare le persone a comprendere l’importanza e il grande valore di poter fruire di acque sane e incontaminate.

“Segui l’acqua” è infatti il mantra che gli scienziati della NASA usano mentre esplorano l’Universo. Un’acqua che è fonte, matrice e sostentamento di tutta la vita conosciuta.

L’acqua migliora anche la qualità della nostra vita.

Una maggiore consapevolezza del vero valore dell’ambiente acquatico costruirà un movimento *Blue Mind* più forte, più profondo, più ampio e duraturo e sottolineerà l’importanza degli sforzi di conservazione, protezione e riqualificazione degli spazi blu.

E’ necessario quindi impegnarsi per migliorare l’educazione sui benefici dell’acqua per la salute, per garantire adeguati livelli di sicurezza, per formare nuove competenze e per migliorare l’accesso ad un’acqua “sana” per ogni comunità.

In questo modo, le acque e gli oceani potranno diventare di fatto una medicina ideale, per tutta la vita e per tutte le persone.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

The Blue Mind Movement Endorsements to Date

Individuals

- Alonso Aguirre, DVM, PhD, Chair, Department of Environmental Science and Policy, George Mason University, VA, USA
- Abigail Alling, Founder & President, Biosphere Foundation, USA/Southeast Asia
- Susan Allison-Dean, MS, RN, AHN-BC, Founder of The Nature Nurse, Armonk, NY, USA
- Bill Arigi, MFT, Licensed Marriage and Family Therapist, Kentfield, CA, USA
- Timothy Beatley, PhD, Teresa Heinz Professor of Sustainable Communities, School of Architecture, University of Virginia, VA, USA
- Bruce E. Becker, MD, MS, FACSM, Former Director, the the National Aquatics & Sports Medicine Institute, Washington State University; Clinical Professor, University of Washington School of Medicine, WA, USA
- Christine Beggs, Creative Director of Christine Ren Films, University of Miami RSMAS '13, Santa Cruz, CA, USA
- Lisa M. Belisle, M.D., M.P.H., Physician, Central Maine HealthCare; Host, Love Maine Radio, ME, USA
- Lindsay M. Bira, Ph.D., Clinical Health Psychologist & Assistant Professor of Psychiatry, University of Texas Health, San Antonio, TX, USA
- Milton Bluehouse Jr, Environmental mediator and facilitator, Ganado, AZ, USA
- Suzanne E, Bott, PhD, AICP, Environmental Psychologist & Land Planner, College of Architecture, Planning, & Landscape Architecture, University of Arizona, USA
- Mary Brechtel, DC, DACBN, Associate Professor in Family Medicine, University of Texas Medical Branch, Galveston, TX, USA
- Casey Brechtel, DVM, PhD, CAC, Veterinarian and Veterinary Chiropractor, Galveston, TX, USA
- Tom Brightman, MES, Lecturer, Master of Environmental Studies Program, University of Pennsylvania, Kennett Square, PA, USA
- Kyle Cahill, Director, Sustainability & Environmental Health, Blue Cross Blue Shield of MA, Boston, MA, USA
- Larissa Carvalho Tavares, Engº Agrônoma e Tec. Meio Ambiente, Florianópolis, Brazil
- Graciela Castellano MD, Preventive and Social Medicine Dept.Udelar, Uruguay
- Bruckner Chase, Chief Executive Officer, Bruckner Chase Ocean Positive Inc, Ocean City, NJ, USA
- Robin Clarke, Environment and Health Care Writer, Cape Cod, MA, USA
- Matt Claybaugh, PhD, President & CEO, Marimed Foundation, Kaneohe, HI, USA
- Céline Cousteau, Director/Producer, CauseCentric Productions, Stone Ridge, NY, USA
- Heide Crino, RN, BSN, St.Petersburg, FL, USA
- Liz Cunningham, Author of *Ocean Country* and *Talking Politics*, founder of KurtHahn.org, Berkeley, CA USA
- Sachi Cunningham, MJ, Assistant Professor of Journalism, San Francisco State University, CA, USA
- Thomas J. Doherty, Psy.D., Licensed Psychologist, Lewis & Clark Graduate School, Portland, OR, USA
- Caro Dratva, Development Director, Marine Conservation Institute, Glen Ellen, CA, USA
- Jake F. Dunagan, PhD, Director of Design Futures, verynice.co, Professor of Foresight, California College of the Arts, CA, USA
- Leila Dunne Monroe, Founding Partner & Attorney for Oceans, Clear Resource Law, San Francisco, CA, USA
- Paola Espitia, MS, International Speaker and Communications Consultant at Ola'pi Creative, Nova Southeastern University Oceanographic Center '13, Fort Lauderdale, FL, USA
- Marcus Eriksen, Research Director, PhD, The 5 Gyres Institute, Los Angeles, CA, USA
- Brett Fitzgerald, Environmental Educator, Builder & Designer. EarthBuilt Associates. Fort Collins, CO, USA
- Captain Joel F. Fogel, Member Chair, The Explorers Club & President, Waterwatch International, Ocean City, NJ, USA
- Victoria Galbraith, Registered Practitioner Psychologist, Director at SEAcotherapy, UK
- Nahid D. Gani, PhD, Assistant Professor of Geology, Department of Geography and Geology, Western Kentucky University, KY, USA
- M. Royhan Gani, PhD, Associate Professor, Western Kentucky University, KY, USA
- Dianne Gray, Hospice and Healthcare Communications, Elisabeth Kubler-Ross Foundation, Naples, FL, USA
- Michael M Goodblatt, MD, Family Physician in Anchorage, AK, USA
- Elizabeth Handy, MS, LCPC, Psychotherapist and Faculty at George Washington University Department of Medicine, Washington, DC, USA
- Tania Haberland, BA, HDE, MA, Holistic coach, CreatiVita & co-creator of Oceanic Somatics, (la Gaulette, Mauritius & Milan, Ita USA
- Angela Haren, Founding Partner, Clear Resource Law, Washington, DC, USA
- Shelli Hendricks, MS, Education, Executive Coach and President, Blue Horizon Solutions, LLC, Danville, CA, USA
- Nancy M. Higgs, RN, BSN, WaterWayBabies, Houston, TX, USA
- Ayana Elizabeth Johnson, PhD, Brooklyn, NY, USA
- Laura K Jordan-Smith, PhD, Founder & Director, World Below the Waves, La Jolla, CA, USA
- Peter Kahn, Editor-in-Chief, Ecopsychology, Professor of Psychology & Environmental and Forest Science, University of Washington, Seattle, WA, USA
- Layne Kalbfleisch, M.Ed, PhD, Pediatrics, George Washington University School of Medicine and Health Sciences, Washington, DC, USA
- Mira Kanter, RD, CHC, Encinitas, CA USA
- Graeme Kelleher, AO, FTSE, FEIANZ, Ocean Elder, Canberra, ACT, AUSTRALIA
- Petra Kelsey, MD, Resident Physician, Department of Family Medicine, University of Wisconsin, Madison, WI, USA
- Dacher Keltner, PhD, Faculty Director Greater Good Science Center, Thomas and Ruth Ann Hornaday Professor of Psychology, University of California, Berkeley, USA

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

- Carol S.Kerr, M.Ed, LPC, LCDC, CEAP, Psychotherapist, Galveston, TX, USA
- Kathi Koontz, Director, California Whale Rescue, Ross, CA, USA
- Laura Parker Roerden, Founding Director, Ocean Matters, MA, USA
- Fabrizio Dalle Piane, Holistic coach, CreatiVita & co-creator of Oceanic Somatics, la Gaulette, Mauritius & Milan, Italy
- Wesley Stewart, Founder, Urban Surf 4 Kids, Surf Therapy for Children in Need
- Gretchen A. Pianka, MD, MPH, FAAP, Pediatrician, Midcoast Pediatrics, Brunswick, Maine, USA
- John La Puma, MD, Director, Chef Clinic Culinary Medicine, Santa Barbara, CA, USA
- Toben Lafrancois, PhD, Adjunct Assistant Professor of Natural Resources & Ecology, Northland College, WI, USA
- Lizzi Larbalestier, MA, ICF: PCC Executive Coach, Director and Coherence Facilitator at Going Coastal - Liquid Ontology for a Fluid World, Cornwall, UK
- Rebecca Schwartz Lesberg, Director of Conservation, San Diego Audubon, CA, USA
- Pam Longobardi, Distinguished University Professor of Art, Georgia State University, Atlanta, USA
- Matt Love, Senior Conservation Biologist, Ocean Conservancy. Fairhope, AL, USA
- Rod Mast, Executive Director, Oceanic Society, Ross, CA, USA
- Carol Milner, Founder and Chairman Biosphere Association, UK
- Victor Minces, PhD, Project Scientist, Department of Cognitive Science, University of California, San Diego, CA, USA
- Laura H. Mitchell, PhD, MFT, Director, Sky Mountain Institute - Ecopsychology & EcoArts Therapy Training Programs, CA, USA
- Wallace J. Nichols, PhD, Research Associate, California Academy of Sciences, CA, USA
- Thomas F. Norris, President, Bio-Waves Inc., Encinitas, CA, USA
- Craig Norton, MA, Chief Operations Officer, Marimed Foundation, Kaneohe HI, USA
- Jack O'Neill, Founder of O'Neill, Lifetime Surfer, Surfboard + Wetsuit Designer + Manufacturer, Santa Cruz, CA, USA
- Timothy O'Shea, CEO + Co-Founder, CleanFish, fish you can trust®, Advisory on Coastal Commission, Ocean Protection, State of California, USA
- Paul A. Paez, DC, Director, Paez Chiro Care, Encinitas, CA, USA
- Paul K. Piff, PhD, Assistant Professor of Psychology & Social Behavior, University of California, Irvine, CA, USA
- Yat-Long Poon, MAS, Adjunct Professor of Biology, San Diego Miramar College, CA, USA
- Luis Antonio Ramos, PhD, DVM, Ecology Adviser, Fundación Zoológica de El Salvador - FUNZEL, San Salvador, El Salvador
- Scott Ramsey, PhD.Associate Professor, Virginia Wesleyan College, Adjunct Professor Prescott College, Director of the Alaska Outdoor Science School, Haines, Alaska.,
- Kellie Raydon, ND, MSOM, Physician & Integrative Women's Health Residency Supervisor at A Woman's Time, Portland, OR, USA
- Carlton F. Roos, MD, Neuroradiologist, Mountain Pro Imaging, Seattle, Washington, USA
- Dori Rosenberg, PhD, MPH, Assistant Investigator, Group Health Research Institute, Seattle, WA
- Bill Rosenblatt, Ed.D. Licensed Psychologist, formerly Director of Behavioral Medicine Monmouth Medical Center, Morristown Memorial Hospital, Adjunct Professor, Monmouth University, Former Chairman of the Board of Directors, Surfrider Foundation, NY, USA
- Judith Rubin LCSW, Psychotherapist, Retired Veterans Administration Mental Health Social Worker, San Francisco, CA, USA
- Ilene S. Ruhoy, MD, PhD, Medical Director, Board-Certified Neurologist, Center for Healing Neurology, Seattle, WA, USA
- Leslie E. Ruyle, PhD, Assistant Director & Assistant Research Scientist, Center on Conflict & Development, Texas A&M University, TX, USA
- Sara Sage, MS, LMHC, Counselor, Elkhart, Indiana, USA
- Darren Schreiber, JD, PhD, Senior Lecturer in Politics, University of Exeter, UK
- Bernadette Schmuker, LMT, Integrative Sports & Body Mechanics Therapist through Hydrophysiotherapy, Ensenada, Baja California, Mexico
- Jason Scorse, PhD, Associate Professor, Director, Center for the Blue Economy, Middlebury Institute of International Studies, Monterey, CA, USA
- Zachary Slobig, Independent Journalist, Pulitzer Center Grantee, CA, USA
- Natalie Luka Spear, MS, CMT, CYT, 2016 NOAA Sea Grant Knauss Fellow at US EPA, Washington, DC, USA
- Molly Steinwald, MS, Executive Director, Environmental Learning Center, Vero Beach, FL, USA
- Daniel Stephenson, MD, Orthopaedic Surgeon / Sports Medicine Specialist, Torrance Orthopaedics and Sports Medicine, Torrance, CA, USA
- Gregory Verutes, Science Education Lead, Natural Capital Project, Stanford, CA, USA
- Andrew Stern, MD, Associate Professor of Neurology, University of Rochester School of Medicine, NY, USA
- Michael Stewart, Co-founder, Sustainable Surf, CA, USA
- Benjamin Thwaits, MS, Program Director, Northwest Passage Ltd., WI, USA
- Casper van de Geer, Manager, Local Ocean Trust: Watamu Turtle Watch, Watamu, Kenya
- Mark Van Thillo, Chief Operations Officer, Biosphere Foundation, USA/Southeast Asia
- Rhian Tilley, Relational-Integrative Psychotherapist, currently affiliated with universities in Cardiff, Wales, UK
- Susana Vega, CNM, MSN, Nurse-Midwife, Millennium Pregnancy and Gynecology, Woodbridge, VA, USA
- Sylvia K. Vitazkova, PhD, Owner and Director, InBodied Living & Co. Wellbeing Coaching and Consulting, Wildlife Conservation, Barrington Hills, IL, USA
- Amir Vokshoor, MD, Neurosurgery, PSJHC - Spine Institute, Marina del Rey, CA, USA
- Sebastian Völker, PhD, Consultant Strategic Data Management, Association of Statutory Health Insurance Physicians, Westfalen-Lippe, Germany
- Lori R. Weiner, MSW, LCSW, Student Affairs Case Manager, University of California San Diego, CA, USA
- Kristen Weiss, PhD, Early Career Fellow in Science Communication, Center for Ocean Solutions, Stanford University, CA, USA
- Florence Williams, Independent journalist and author, Washington, DC, USA

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

- Toine Wilke, MSc, Co-founder, Seagreen Foods, Amsterdam, Netherlands
- J. E. Williams, OMD, FAAIM - Florida Integrative Medical Center, Former Academic Dean, East West College of Natural Medicine, FL, USA
- Sarah W. Wyckoff, MA, Holistic Multi-modal Transformative Facilitator, Freeheart Ranch, San Diego, CA, USA
- Michael Wynn DO, Board Certified Neurology/Vascular Neurology, Salem, OR, USA
- Alisa Zych, MS, Wildlife Biologist, Cardiff by the Sea, CA, USA

Organizations & Institutions

- Associação Ambiental Ocean Revolution, Moçambique
- Biosphere Foundation, USA/Southeast Asia
- The Blue Mind Companies, CA + VA, USA
- California Whale Rescue, Ross, CA, USA
- Coastal Watershed Council, Santa Cruz, CA, USA
- Colorado Ocean Coalition, Boulder, CO, USA
- Fabien Cousteau Ocean Learning Center, Inc. New York, NY, USA
- HealthMatters Chiropractic, TX, USA
- Kids 4 Planet Earth, CA, USA
- La Duna Centro Ecológico, La Paz, Baja California Sur, México
- The Live Blue Foundation, CA, USA
- Lonely Whale Foundation, NY + WA + CA, USA
- Northwest Passage Ltd., WI, USA
- Ocean Connectors, San Diego, CA, USA
- Ocean Conservation Research, CA, USA
- The Ocean Foundation, Washington, DC, USA
- Ocean Matters, MA, USA
- Oceanic Society, Ross, CA, USA
- Ocean Revolution Cmiique, Sociiax, Hant Comcaac
- Ocean Revolution, Washington DC, USA
- Operation Surf, CA, USA
- Paez Chiro Care, CA, USA
- Plastic Oceans Foundation, Los Angeles, CA, USA
- RED Travel México, BCS, México
- SEETurtles.org, Portland, OR, USA
- Sky Mountain Institute, CA, USA
- Slow Coast: Authentic Coastal Spirit, Davenport, CA, USA
- Surfani, San Bruno, CA
- Surfing Heritage & Culture Center, San Clemente, CA, USA
- Sustainable Surf, San Francisco, CA, USA
- The 5 Gyres Institute, Los Angeles, CA, USA
- The Wahine Project, Monterey, CA, USA
- Urban Surf 4 Kids, San Diego, Ca + Daytona Beach, Fl
- WILDCOAST, Imperial Beach, CA, USA

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Selected *Blue Mind* Peer-Reviewed Research and Summaries

Aguirre, A. A., and E. S. Weber III (2012) Living Ocean, an Evolving Oxymoron. *In* R.A. Meyers (ed.), *Encyclopedia of Sustainability Science and Technology*, Springer, New York, pp. 6179-6202.

There is growing evidence that the ecological integrity of marine ecosystems is under increasing threat. Symptoms of collective human impacts on the marine environment include harmful algal blooms, overfishing, loss of breeding/nursery habitats, and the spread of persistent chemical pollutants. Many populations of marine mammals, marine birds, and sea turtles are exposed to pollutants from agricultural runoff, human sewage, and pathogens with a terrestrial origin. Unprecedented numbers of emerging and re-emerging diseases have been documented in recent times in the marine environment. However, all these symptoms of poor ecological health represent an opportunity to humanity to change our ways and behaviors towards the ocean.

Alling, A., M. Nelson, S. Silverstone, and M. Van Thillo (2002) Human Factor Observations of the Biosphere 2, 1991-1993, Closed Life Support Human Experiment and Its Application to a Long-Term Manned Mission to Mars. *Life Support and Biosphere Science* 8:71-82.

We left the two year experiment inside Biosphere 2 with a profound understanding, both intellectually and on a bodily, organic level, that the living ecosystems inside Biosphere 2 were virtually synonymous with our own health and survival: If the biosphere was healthy, we were healthy. … We became more sensitive to minute differences in colors of coral organisms and plant leaves, aware of sunlight and cloud cover, humidity and moisture levels, and other basic life support requirements. This interest in our environment was pervasive – we wished to enhance the vitality and well-being of our life support system, which in turn brought harmony to our life. Evolution has evolved humans amongst innumerable species that provide Earth its life-giving properties, and a delight in nature is basic to every healthy human from whatever culture. The idea that humanity will be able to travel or live and work for years in space without plants and other life forms is nonsense. This is a concept that ignores the core of our being as humans and which, if carried out, will cause alienation and despair to the crew. Putting reliance on physical-chemical technologies and robots is not the path to long term sustaining and sustainable life support systems for space. Though we may take initial steps in space with such systems, and with highly automated systems growing hydroponic food crops, these approaches will not themselves evolve into nor replace the complex life support biospheric systems which are needed, ecologically and psychologically, for living long-term off our Home Planet.

The engineering and design of Biosphere 2 faced tasks such as ensuring that all by-products of technical systems (outgassing of paints, glues and the use of steel, chemicals, etc.) would be recycled safely within the facility's air, water and soil systems. The daily operations also required new ideas about intelligent management of the total system, such as how to decrease global daily CO2 in the atmosphere or how to raise the ocean pH. The inhabitants of Biosphere 2 were both managers of the closed system – meeting daily to determine which tasks would benefit the total system the most in terms of efficient operations – and we were part of the experiment observing the system processes. Biosphere 2 was thus not only a mini-scale laboratory to study the Earth's biosphere system, but a test-bed and accelerator for developing a noosphere. Through this process, information exchange was rapid and accelerated leading to more intelligent responses for survival. We learned how to exist in this new biosphere — which in turn was evolving as a new biosphere-technosphere creation — and which, through experience, became an extension of ourselves.

Amoly E., P. Dadvand, J. Forns, M. López-Vicente, X. Basagaña X, J. Julvez, M. Alvarez-Pedrerol, M. Nieuwenhuijsen, and J. Sunyer (2014) Green and blue spaces and behavioral development in Barcelona schoolchildren: The BREATHE Project. *Environmental Health Perspectives* 122:1351–1358.

We generally estimated beneficial associations between behavioral indicators and longer time spent in green spaces and beaches, and with residential surrounding greenness. Specifically, we found statistically significant inverse associations between green space playing time and SDQ [Strengths and Difficulties Questionnaires] total difficulties, emotional symptoms, and peer relationship problems; between residential surrounding greenness and SDQ total difficulties and hyperactivity/inattention and ADHD/DSM-IV total and inattention scores; and between annual beach attendance and SDQ total difficulties, peer relationship problems, and prosocial behavior. For proximity to major green spaces, the results were not conclusive. Conclusion: Our findings support beneficial impacts of contact with green and blue spaces on behavioral development in schoolchildren.

Amrhein, M., Barkhoff, H., & Heiby, E. M. (2016). Spirituality, Depression, and Anxiety Among Ocean Surfers, Journal of Clinical Sport Psychology, 10(2), 155-171. Retrieved Mar 5, 2021, from https://journals.humankinetics.com/view/journals/jcsp/10/2/article-p155.xml

Although research on the psychological correlates of ocean surfing is scarce, substantial anecdotal evidence suggests that the sport offers a uniquely positive experience. Prior research has demonstrated that surfers report fewer symptoms of depression and anxiety than normative groups, but no explanation has been identified. Greater spirituality has been correlated with lower depression and anxiety, and many surfers have described surfing as a spiritual experience, indicating a potential connection. One hundred surfers were recruited from the Hawaiian Islands and the mid-Atlantic region of the United States. Participants reported their surfing habits and levels of their spiritual surfing experiences. Standardized tests were used to measure participants' spirituality, depression, and anxiety levels. Results indicated that surfers reported fewer symptoms of depression and anxiety than most available normative groups. Results also demonstrated that greater spirituality is associated with less depression and more spiritual surfing experiences.

Armitano, C. N., Clapham, E. D., Lamont, L. S., & Audette, J. G. (2015). Benefits of Surfing for Children with Disabilities: A Pilot Study. Palaestra, 29(3), 31-34. doi: 10.18666/PALAESTRA-2015-V29-I3-6912

The purpose of this study was to assess the effectiveness of an eight-week surfing intervention for 16 children with disabilities. The assessment procedure consisted of pre and post physical fitness measures to determine the benefits of this intervention. Our results showed an overall improvement in upper body strength (right: P = 0.024, left: P = 0.022), core strength (P = 0.002) and cardiorespiratory endurance (P = 0.013). This research is the first of its kind, illustrating the feasibility and effectiveness of a surfing intervention on improving the physical fitness of children with disabilities.

Barton, J., and J. Pretty (2010) What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environmental Science & Technology* 44(10): 3947-3955.

Green exercise is activity in the presence of nature. Evidence shows it leads to positive short and long-term health outcomes. This multistudy analysis assessed the best regime of dose(s) of acute exposure to green exercise required to improve self-esteem and mood (indicators of mental health) ... Dose responses for both intensity and duration showed large benefits from short engagements in green exercise, and then diminishing but still positive returns. Every green environment improved both self-esteem and mood; the presence of water generated greater effects. Both men and women had similar improvements in self-esteem after green exercise, though men showed a difference for mood. Age groups: for self-esteem, the greatest change was in the youngest, with diminishing effects with age; for mood, the least change was in the young and old. The mentally ill had one of the greatest self-esteem improvements. This study confirms that the environment provides an important health service.

Bauman, A., Smith, B., Stoker, L., Bellew, B., Booth, M. (1999) Geographical influences upon physical activity participation: evidence of a coastal effect. Aust. N. Z. Journal of Public Health 23: 322–324.

Objective: To examine the association between geographical proximity to the coast and physical activity participation levels.

Method: Using stratified random sampling, a telephone survey was carried out in 1994 with 1000 adults in each of the 16 health service regions in New South Wales (N=16178).Physical activity levels were measured through self-report of the frequency and duration of walking, moderate and vigorous activities in the two weeks preceding the survey. Logistic regression modelling was carried out to examine the association between physical activity and 'coastal' location of residence, adjusting for age, sex, employment status, education level and country of birth. Results: After adjusting for other demographic factors, respondents who lived in a coastal postcode were 23%less likely to b e classified as sedentary, 27% more likely to report levels of activity considered adequate for health, and 38% more likely to report high (vigorous)levels of physical activity than those who lived inland. Each of these associations was significant at the 0.05 level.

Conclusions: Characteristics of the physical environment in coastal postcodes are related to physical activity participation.

Implications: Physical environments may contribute to physical activity participation. Further efforts to conceptualise and measure these environmental influences is warranted. Public health efforts to promote physical activity should consider aspects of the physical environment as part of any intervention.

Becker, B. E. (2009) Aquatic therapy: Scientific foundations and clinical rehabilitation applications. *American Academy of Physical Medicine and Rehabilitation* 1: 859-872.

The aquatic environment has broad rehabilitative potential, extending from the treatment of acute injuries through health maintenance in the face of chronic diseases, yet it remains an underused modality. There is an extensive research base supporting aquatic therapy, both within the basic science literature and clinical literature. This article describes the many physiologic changes that occur during immersion as applied to a range of common rehabilitative issues and problems. Because of its wide margin of therapeutic safety and clinical adaptability, aquatic therapy is a very useful tool in the rehabilitative toolbox. Through a better understanding of the applied physiology, the practitioner may structure appropriate therapeutic programs for a diverse patient population.

Bell, Siân & Graham, Hilary & Jarvis, Stuart & White, Piran. (2017). The importance of nature in mediating social and psychological benefits associated with visits to freshwater blue space. Landscape and Urban Planning. 167. 118-127. 10.1016/j.landurbplan.2017.06.003.

There is increasing appreciation of the benefits associated with exposure to natural environments. However, most of the evidence relates to green space with much less on blue space. Drawing on data from a British survey of adults, we describe the characteristics of visits to blue space and investigate whether the benefits reported in studies of green space – physical activity, social interaction, and psychological benefits – are evident with respect to blue space. We also examine the importance of nature to people's visits to blue space and investigate the sociodemographic predictors of visit frequency and location, the benefits received, and the importance of nature to the visit. Social interaction and psychological benefits were the most important benefits obtained from visiting blue space. Socioeconomic status was a predictor of both frequency and location of visits and was also associated with identifying social interaction as the most important benefit. Respondents who reported psychological benefits as the most important benefit were more likely to find nature very important to their visit. These findings highlight the social and psychological benefits obtained from visits to blue space, and provide new evidence on the importance of the natural environment in underpinning these benefits and enriching people's lives.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Bell, S.L.,Phoenix, C., Lovell, R., Wheeler, B.W. (2015) Seeking everyday wellbeing: The coast as a therapeutic landscape. *Social Science & Medicine* 142: 56-67.

Recent research suggests coastal environments may promote human health and wellbeing. This article explores the diverse coastal experiences sought out by residents of two towns in south west England to promote and preserve their personal wellbeing in the context of their everyday lives. It draws on the findings of an in-depth interpretive study conducted from May to November 2013 that examined the relative contribution of varied green and blue space experiences to individual wellbeing through the life course. Personalised activity maps produced using accelerometer and Global Positioning System (GPS) data were used to guide in-depth geo-narrative interviews with a purposive sample of 33 participants. This was combined with a subset of nine case study go-along interviews in places deemed therapeutic by the participants themselves, offering deeper insight into the lived experiences and relationships playing out within such places. Situated in a novel adaptation of the therapeutic landscapes framework, this article explores how symbolic, achievement-oriented, immersive and social experiences contributed to participants' sense of wellbeing in their local coastal areas. Participants expressed particularly strong and often enduring connections to the local coastline, with different coastal stretches perceived to cater for varied therapeutic needs and interests, at multiple scales and intensities. The findings suggest the need for greater acknowledgement of people's emotional, deeply embodied and often shared connections to the coast within coastal management policy and practice, both nationally and internationally. Importantly, such efforts should recognise the fluid, dynamic nature of this land-sea boundary, and the valued therapeutic experiences linked to this fluidity.

Bennett, Jessie L, Piatt, Jennifer A, and Van Puymbroeck, Marieke. "Outcomes of a Therapeutic Fly-Fishing Program for Veterans with Combat-Related Disabilities: A Community-Based Rehabilitation Initiative." Community Mental Health Journal 53.7 (2017): 756-65. Web.

The purpose of this study was to examine the outcomes of a therapeutic fly-fishing program for veterans with combat-related disabilities. A total of 40 veterans participated in the 4-day therapeutic fly-fishing program and this study. The outcomes examined included reducing symptoms of posttraumatic stress (PTS), depression, perceived stress, functional impairment (i.e., work, relationships, physical, and everyday life), increasing self-determination, and leisure satisfaction. Each research participant completed pretest, posttest, and 3-month follow-up questionnaires. Repeated measures MANOVA and ANOVA were conducted to examine the differences between the three time points on each outcomes. The results indicated significant decreases from the pretest to posttest for symptoms of PTS, depression, perceived stress, and functional impairment, and an increase in leisure satisfaction from pretest to 3-month follow-up. These results highlight the use of therapeutic recreation programming for veterans with disabilities as a holistic approach to treatment and recovery.

Buxton, R. T., Pearson, A. L., Allou, C., Fristrup, K., & Wittemyer, G. (2021). A synthesis of health benefits of natural sounds and their distribution in national parks. Proceedings of the National Academy of Sciences, 118(14).

Parks are important places to listen to natural sounds and avoid human-related noise, an increasingly rare combination. We first explore whether and to what degree natural sounds influence health outcomes using a systematic literature review and metaanalysis. ...Of the three types of natural sounds (birds, water, and mixed), we found that water sounds had the largest mean effect size for health and positive affect outcomes (2.01, 95% CI = 0.35, 3.67), and bird sounds had the largest mean effect size for stress and annoyance (1.11, 95% CI = −1.82, −0.4).... Examples of beneficial outcomes include decreased pain, lower stress, improved mood, and enhanced cognitive performance. Given this evidence, and to facilitate incorporating public health in US national park soundscape management, we then examined the distribution of natural sounds in relation to anthropogenic sound at 221 sites across 68 parks. National park soundscapes with little anthropogenic sound and abundant natural sounds occurred at 11.3% of the sites. Parks with high visitation and urban park sites had more anthropogenic sound, yet natural sounds associated with health benefits also were frequent. These included animal sounds (audible for a mean of 59.3% of the time, SD: 23.8) and sounds from wind and water (mean:

19.2%, SD: 14.8). Urban and other parks that are extensively visited offer important opportunities to experience natural sounds and are significant targets for soundscape conservation to bolster health for visitors. Our results assert that natural sounds provide important ecosystem services, and parks can bolster public health by highlighting and conserving natural soundscapes.

Bratman, G. N., J. P. Hamilton, K. S. Hahn, G. C. Daily, and J. J. Gross 2015. Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences* 112(28):8567–8572.

More than 50% of people now live in urban areas. By 2050 this proportion will be 70%. Urbanization is associated with increased levels of mental illness, but it's not yet clear why. Through a controlled experiment, we investigated whether nature experience would influence rumination (repetitive thought focused on negative aspects of the self), a known risk factor for mental illness. Participants who went on a 90-min walk through a natural environment reported lower levels of rumination and showed reduced neural activity in an area of the brain linked to risk for mental illness compared with those who walked through an urban environment. These results suggest that accessible natural areas may be vital for mental health in our rapidly urbanizing world.

Britton E, Kindermann G, Domegan C, Carlin C. Blue care: a systematic review of blue space interventions for health and wellbeing. Health Promot Int. 2020 Feb 1;35(1):50-69. doi: 10.1093/heapro/day103. PMID: 30561661; PMCID: PMC7245048.

There is increasing interest in the potential use of outdoor water environments, or blue space, in the promotion of human health and wellbeing. However, therapeutic nature-based practices are currently outpacing policy and the evidence base for health or wellbeing benefits of therapeutic interventions within blue space has not been systematically assessed. This systematic review aims to address the gap in understanding the impacts of blue space within existing interventions for targeted individuals. … Overall, the studies suggest that blue care can have direct benefit for health, especially mental health and psycho-social wellbeing. This is the first systematic review of the literature on blue care. In summary, it has been shown that mental health, especially psycho-social wellbeing, can be improved with investment in blue spaces. Key areas for future research include improving understanding of the mechanisms through which blue care can improve public health promotion.

Burkart, K., F. Meier, A. Schneider, S. Breitner, P. Canário, M. J. Alcoforado, D. Scherer, and W. Endlicher (2016) Modification of heat-related mortality in an elderly urban population by vegetation (Urban green) and proximity to water (Urban blue) evidence from Lisbon, Portugal. Environmental Health Perspectives 124: 927–934.

Background: Urban populations are highly vulnerable to the adverse effects of heat, with heat-related mortality showing intra-urban variations that are likely due to differences in urban characteristics and socioeconomic status.

Objectives: We investigated the influence of urban green and urban blue, that is, urban vegetation and water bodies, on heat-related excess mortality in the elderly > 65 years old in Lisbon, Portugal, between 1998 and 2008.

Methods: We used remotely sensed data and geographic information to determine the amount of urban vegetation and the distance to bodies of water (the Atlantic Ocean and the Tagus Estuary). Poisson generalized additive models were fitted, allowing for the interaction between equivalent temperature [universal thermal climate index (UTCI)] and quartiles of urban greenness [classified using the Normalized Difference Vegetation Index (NDVI)] and proximity to water (≤ 4 km vs. > 4 km), while adjusting for potential confounders.

Results: The association between mortality and a 1°C increase in UTCI above the 99th percentile (24.8°C) was stronger for areas in the lowest NDVI quartile (14.7% higher; 95% CI: 1.9, 17.5%) than for areas in the highest quartile (3.0%; 95% CI: 2.0, 4.0%). In areas > 4 km from water, a 1°C increase in UTCI above the 99th percentile was associated with a 7.1% increase in mortality (95% CI: 6.2, 8.1%), whereas in areas ≤ 4 km from water, the estimated increase in mortality was only 2.1% (95% CI: 1.2, 3.0%).

Conclusions: Urban green and blue appeared to have a mitigating effect on heat-related mortality in the elderly population in Lisbon. Increasing the amount of vegetation may be a good strategy to counteract the adverse effects of heat in urban areas. Our findings also suggest potential benefits of urban blue that may be present several kilometers from a body of water.

Caddick N, Smith B, Phoenix C. The effects of surfing and the natural environment on the well-being of combat veterans. Qual Health Res. 2015 Jan;25(1):76-86. doi: 10.1177/1049732314549477. Epub 2014 Sep 4. PMID: 25189537.

Although researchers have identified the benefits of physical activity on well-being, there is little evidence concerning the effects of nature-based physical activity. This article investigated the effect of one nature-based activity-surfing-on the well-being of combat veterans experiencing posttraumatic stress disorder (PTSD). Interviews and participant observations were conducted with a group of combat veterans belonging to a United Kingdom-based veterans' surfing charity. The primary analytical approach was dialogical narrative analysis. Based on the rigorous analysis and findings, it is suggested that surfing facilitated a sense of respite from PTSD. Respite was a fully embodied feeling of release from suffering that was cultivated through surfing and shaped by the stories veterans told of their experiences. This article significantly extends previous knowledge on physical activity, combat veterans, and PTSD by highlighting how nature-based physical activity, encapsulated in the conceptual notion of the "blue gym," can promote well-being among combat veterans.

Carin-Levy G, Jones D. Psychosocial aspects of scuba diving for people with physical disabilities: an occupational science perspective. Can J Occup Ther. 2007 Feb;74(1):6-14. doi: 10.2182/cjot.06.07. PMID: 17319318.

The purpose of this study was to investigate the psychosocial benefits of scuba diving for individuals with acquired physical impairments. In-depth, semi-structured interviews were conducted with 3 volunteers recruited from a diving club specializing in training people with disabilities to dive. Qualitative methods were used to analyze the data in order to identify the themes recurring in the interviews. The respondents indicated that diving is a challenging, enjoyable activity that enhances their quality of life through enriched social experiences and improved self-concept. Furthermore, subjects stressed that carrying out the activity in a buoyant environment allowed them to feel weightless, thus free from their impairments and equal to non-disabled divers.

Carter, H. H., A. L. Spence, C. J. A. Pugh, P. Ainslie, L. H. Naylor, and D. J. Green (2014) Cardiovascular responses to water immersion in humans: impact on cerebral perfusion. *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology* 306(9): 636-640.

Episodic increases in cerebrovascular perfusion and shear stress may have beneficial impacts on endothelial function that improve brain health. It was hypothesized that water immersion to the level of the right atrium in humans would increase cerebral perfusion. This study provides an evidence base for future studies to examine the potential additive effect of exercise in water on improving cerebrovascular health.

Cavanaugh L. K., Rademacher S. B. (2014) How a SURFing social skills curriculum can impact children with autism spectrum disorders. *Journal of the International Association of Special Education*, 15, 27–35.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

An average of one in 88 children in the United States are diagnosed with autism spectrum disorder (ASD) (Centers for Disease Control and Prevention, 2012). Individuals with ASD demonstrate poor social interaction, poor social competence, and lowered self-esteem. Early intervention treatment can improve social development. In recent years more non-traditional therapies, like therapeutic surfing, have emerged. This study measured the outcome of a SURF camp social skills curriculum for 11 campers with ASD aged between 10 and 16 years, 18 parents, and 26 surf camp staff. Data were collected one week prior to camp, at the completion of camp, and then again two weeks following camp. Quantitative analysis revealed assertion, responsibility, and engagement as statistically significant in the social skills domain.

———————

Clapham E. D., Armitano C. N., Lamont L. S., Audette J. G. (2014) The ocean as a unique therapeutic environment: developing a surfing program. *Journal of Physical Education, Recreation and Dance*, 85, 8–14.

Educational aquatic programming offers necessary physical activity opportunities to children with disabilities and the benefits of aquatic activities are more pronounced for children with disabilities than for their able-bodied peers. Similar benefits could potentially be derived from surfing in the ocean. This article describes an adapted surfing program that was designed to develop and enhance the children's strength, flexibility, range of motion, coordination, balance, and psychosocial development. Throughout the program, the children and their surf instructors were encouraged to set realistic individual goals. Many positive outcomes were derived from the project, including gains in social development and self-confidence.

———————

Charen, T. (1951) The Etymology of Medicine. *Bulletin of the Medical Library Association* 39(3): 216–221.

The intention of this article is to reflect upon the origin of the word medicine, to find the ultimate etymological source from which the rivers of this all-reaching science have sprung.

———————

Collins, B. , O'Broin, D. and Casey, N.B., 2009. The meaning of the experience of sea kayaking for persons with spinal cord injury. *Irish Journal of Occupational Therapy*, 29-36.

Engagement in meaningful activity is at the core of occupational therapy; when a person sustains a spinal cord injury (SCI), access to leisure activities that once had meaning may become limited. This study aims to gain an insider’s perspective on the meaning of engaging in kayaking as a leisure pursuit for six adults with a SCI. It compares the findings to an original study by Taylor & McGruder (1995). A qualitative approach using Spradley’s (1979) interviewing technique was employed. A number of meaningful themes matched the original study by Taylor & McGruder (1995) and were consistent with current literature: atmosphere, achievement, adjusting, safety and physical benefits. The two unique findings of this study were the themes of sense of freedom and equality. Overall, kayaking was found to offer the participants with a SCI a unique experience to participate on equal terms with an able-bodied person, and facilitates freedom of mobility on the water.

———————

Colpus S., Taylor J. (2014) Ride every challenge: the impact of surfing on 100 young people facing personal and emotional challenges. *British Journal of Sports Medicine*, 48, 1581.

The Wave Project began in 2010 when a group of Cornish surfers received a grant from the Cornwall and Isles Of Scilly NHS Primary Care Trust (UK). This was used to explore the effects of surfing on a group of 20 young people with mental health conditions, during a six-week pilot. The results were very positive. Over the following 2 years the Wave Project has grown, enabled by charity funding and volunteers.

The aim of the current study was to show the many positive effects surfing has on young people with varying mental health conditions, personal and social needs. During September 2011–2012 a free six-week surfing course was delivered to 100 young people aged 8–17, referred by schools, the Child and Adolescent Mental Health Service (CAMHS), General Practitioners, Educational Psychologists and Bereavement Charities. They were placed on a six-week course, of 2 hours per session. Sessions were held at weekends in three Cornish locations, during the surf season April–October. Evaluation methods used included attendance sheets; a pre and post course rating scale; client, parent and carer feedback forms; and focus groups. 87 clients completed the six-week course and 72 completed self-evaluation questionnaires. Self-evaluation results revealed that after the course young people felt their confidence, self-esteem and wellbeing had improved. Formal feedback from parents and professionals showed additional improvements in motor and social skills, behaviour and re-engagement with school. Overall it is clear from available evidence that surfing has a positive and beneficial effect on young people. (Ongoing project, https://www.waveproject.co.uk)

Cracknell. D., M. P. White, S. Pahl, W. J. Nichols, and M. H. Depledge (2015) Marine biota and psychological well-being: A preliminary examination of dose–response effects in an aquarium setting. *Environment and Behavior* 1–28.

Exposure to natural environments can have calming and stress-reducing effects on humans. Moreover, previous studies suggest that these benefits may be greater in areas with higher species richness. This study took advantage of a "natural experiment" to examine people's behavioral, physiological, and psychological reactions to increases in levels of marine biota in a large aquarium exhibit during three stages of restocking: Unstocked, Partially stocked, and Fully stocked. Increased biota levels were associated with longer spontaneous viewing of the exhibit, greater reductions in heart rate, greater increases in self-reported mood, and higher interest. Higher biota levels, even in managed settings, may be associated with important well-being and health benefits, particularly for individuals not able to access the natural analogues of managed environments.

Cracknell D., White M. P., Pahl S., Depledge M. H. (2017) A preliminary investigation into the restorative potential of public aquaria exhibits: a UK student-based study. Landscape Research, 42, 18–32.

Even 'managed' natural settings, such as botanical gardens and zoos, can provide restorative experiences. Well-being benefits may also be greater in land/waterscapes with greater biodiversity (eg, species richness). Using two photo studies with student participants, we explored aesthetic and behavioural preferences, affect and the restorative potential of multiple public aquaria exhibits, including variation in biodiversity. Study 1 (N = 39) found that aquarium exhibits, in general, scored as highly as natural environments (eg, green space) on all dimensions. Study 2 (N = 40) examined whether responses were influenced by exhibit characteristics including: climatic region (tropical/temperate), biological group (vertebrates/invertebrates), species richness (high/low) and abundance of individuals (high/low). Supporting predictions, tropical, vertebrate (fish) and high species richness exhibits were generally rated more positively than temperate/invertebrate/low species richness exhibits. However, some low richness/high abundance exhibits were also rated unexpectedly positively. Findings are discussed within the context of the growing well-being and biodiversity literature.

Cracknell, D., Pahl, S., White, M.P. & Depledge, M.H. (2018). Reviewing the role of aquaria as restorative settings: how subaquatic diversity in public aquaria can influence preferences, and human health and well-being. *Human Dimensions of Wildlife*, 23:5, 446-460

Throughout evolutionary history, humans have developed strong reactions to animals and landscape features that have either aided or hindered survival and well-being. Exposure to natural environments provides many perceived and actual health benefits, including reduced mental fatigue, improved mood, and decreased stress and anxiety. Studies exploring humans' responses to their surroundings, however, tend to focus on terrestrial environments. In

contrast, fewer studies have focused on humans' reactions to aquatic settings, or the biodiversity found within them. We provide an overview of the various health and well-being benefits associated with humans' relationships with different aquatic settings and focus on one particular setting: simulated underwater environments (aquaria). We provide a review of aquaria-related studies, including emerging research on how different subaquatic species influence human health and well-being outcomes. Finally, we suggest ways in which the benefits of underwater biodiversity can be further researched.

Del Canale, S., D.Z. Louis, V. Maio, X. Wang, G. Rossi,M. Hojat, and J.S. Gonnella (2012). The relationship between physician empathy and disease complications: an empirical study of primary care physicians and their diabetic patients in Parma, Italy. *Academic Medicine,* 87(9) 1243-1249.

Patients of physicians with high empathy scores, compared with patients of physicians with moderate and low empathy scores, had a significantly lower rate of acute metabolic complications (4.0, 7.1, and 6.5 per 1,000 patients, respectively, P < .05). Logistic regression analysis showed physicians' empathy scores were associated with acute metabolic complications: odds ratio (OR) = 0.59 (95% confidence interval [CI], 0.37–0.95, contrasting physicians with high and low empathy scores). Patients' age (≥69 years) also contributed to the prediction of acute metabolic complications: OR = 1.7 (95% CI, 1.2–1.4). … These results suggest that physician empathy is significantly associated with clinical outcome for patients with diabetes mellitus and should be considered an important component of clinical competence.

Depledge, M. H., and W. J. Bird (2009) The Blue Gym: health and wellbeing from our coasts. *Marine Pollution Bulletin* 58: 947–948.

Coastal areas have always attracted humans. Whether permanent residents or visitors, the presence of the sea motivates outdoor activity and enhances wellbeing. It reminds us of our intimate relationship with natural ecosystems. The Blue Gym programme attempts to not only encourage physical activity and time spent outdoors to help improve health and wellbeing, but also to make people aware of the value of the marine environment. It has the potential to increase understanding of our coasts, allows us to view threats in an appropriate context, and also generates support for preserving the richness and beauty of our seas and the ocean. We neglect these human health aspects of our coasts at our peril.

Donnelly, A. A., T. E. MacIntyre, G. Warrington, N. O'Sullivan, D. Harrison, E. R. Igou, M. Jones, C. Gidlow, R. Cloak, I. Lahart, N. Brick, and A. M. Lane (2016) Environmental influences on Elite Sport Athletes Well Being: From Gold, Silver and Bronze to Blue Green and Gold. *Frontiers in Psychology* 7:1167.

The benefits of exercising in natural environments are recognized, but less is known about the effects on performance and health in elite athletes. Although some Olympic events take place in natural environments, the majority occur in the host city, usually a large densely populated area where low exposure to natural environments is compounded by exposure to high levels of air, water, and noise pollution in the ambient environment. By combining methods and expertise from diverse but inter-related disciplines including environmental psychology, exercise physiology, biomechanics, environmental science, and epidemiology, a transdisciplinary approach will facilitate a greater understanding of the effects of the environment on Olympic athletes.

Dustin D., Bricker N., Arave J., Wall W., West G. (2011) The promise of river running as a therapeutic medium for veterans coping with post-traumatic stress disorder. *Therapeutic Recreation Journal*, 45, 326.

In this article, we discuss therapeutic recreation's role in improving the lives of veterans coping with Post-Traumatic Stress Disorder (PTSD). More specifically, we focus on the promise of river running as a therapeutic medium for treating PTSD. Based on a collaborative pilot project conducted in the summer of 2010

between the Veterans Administration, the University of Utah's Department of Parks, Recreation, and Tourism, and O.A.R.S. (a river rafting company), we identify several areas where therapeutic recreation shows considerable promise in contributing to the healing process. We conclude with a call for an ambitious research agenda to better define the contributory potential of therapeutic recreation in serving combat veterans.

Elliott, L.R., White, M.P., Grellier, J., Rees, S.E., Waters, R.D., Fleming, L.E. (2018) Recreational visits to marine and coastal environments in England: Where, what, who, why, and when? *Marine Policy https://doi.org/10.1016/j.marpol.2018.03.013*

Health and economic benefits may accrue from marine and coastal recreation. In England, few national-level descriptive analyses exist which examine predictors of recreation in these environments. Data were analysed to investigate how many recreational visits were made annually to coastal environments in England, which activities were undertaken on these visits, and which demographic, motivational, temporal, and regional factors predict them. Inland environments are presented for comparison. Approximately 271 million recreational visits were made to coastal environments in England annually. Visits to the coast involving walking were undertaken by a wide spectrum of the population: compared to woodland walks, for instance, coastal walks were more likely to be made by females, older adults, and individuals from lower socioeconomic classifications, suggesting the coast may support reducing activity inequalities. The results provide a reference for current patterns of coastal recreation in England, and could be considered when making policy-level decisions with regard to coastal accessibility and marine plans. Implications for future public health and marine plans are discussed.

Elliott, L.R., M. P. White, A. H. Taylor, and S. Herbert (2015) Energy expenditure on recreational visits to different natural environments: Implications for public health. *Social Science and Medicine* 139: 56-60.

Physical inactivity poses a significant challenge to physical and mental health. Environmental approaches to tackle physical inactivity have identified natural environments as potentially important public health resources. Despite this, little is known about characteristics of the activity involved when individuals visit different types of natural environment. … Visits to countryside and urban greenspace environments were associated with more intense activities than visits to coastal environments. However, visits to coastal environments were associated with the most energy expenditure overall due to their relatively long duration.

Feinstein, J.S., S.S. Khalsa, H. Yeh, C. Wohlrab, W.K. Simmons, M.B. Stein, and M.P. Paulus. 2018. Examining the short-term anxiolytic and antidepressant effect of Floatation-REST. PLoS One. 2018 Feb 2;13(2):e0190292

Floatation-REST (Reduced Environmental Stimulation Therapy) reduces sensory input to the nervous system through the act of floating supine in a pool of water saturated with Epsom salt. The float experience is calibrated so that sensory signals from visual, auditory, olfactory, gustatory, thermal, tactile, vestibular, gravitational and proprioceptive channels are minimized, as is most movement and speech. Floatation-REST substantially reduced state anxiety, and participants reported significant reductions in stress, muscle tension, pain, depression and negative affect, accompanied by a significant improvement in mood characterized by increases in serenity, relaxation, happiness and overall well-being.The most severely anxious participants reported the largest effects. Overall, the procedure was well-tolerated, with no major safety concerns stemming from this single session. The findings from this initial study need to be replicated in larger controlled trials, but suggest that Floatation-REST may be a promising technique for transiently reducing the suffering in those with anxiety and depression.

Fleming L.E., M.H. Depledge, N. McDonough, M.P. White, S. Pahl, M. Austin, A. Goksoyr, H. Solo-Gabriele, and J.J. Stegman (2015) The oceans and human health. In: *Oxford Research Encyclopedia of Environmental Sciences*. Oxford: Oxford University Press.

The effects of climate change on sea level and weather can cause health effects ranging from drowning, injury, and severe mental health impacts (e.g., depression) from flooding to mass population migration and economic impacts.

Fleischmann D., Michalewicz B., Stedje-Larsen E., Neff J., Murphy J., Browning K.,. et al.(2011) Surf medicine: Surfing as a means of therapy for combat-related polytrauma. *Journal of Prosthetics and Orthotics*, 23, 27–29

Among the thousands of US Service members wounded in Iraq, many have sustained multiple traumas and developed physical and mental injuries. The term "polytrauma" refers to concurrent injury to the brain and several body areas or organ systems that result in physical, cognitive, and psychosocial impairments. Although many therapeutic modalities are available for patients with polytrauma, only a few modalities simultaneously address global rehabilitation, including pain, vestibular impairment, and cognitive symptoms. The sport of surfing involves aspects of hydrotherapy, strength training, balance rehabilitation, and group supportive therapy. Recent adaptations have been made that allow those with severe injuries and missing limbs to learn how to surf.

Foley R. Swimming in Ireland: Immersions in therapeutic blue space. Health Place. 2015 Sep;35:218-25. doi: 10.1016/j.healthplace.2014.09.015. PMID: 25456012.

This paper explores swimming as a healthy body-water engagement in blue space at selected outdoor Irish swimming spots. … This paper uses observer participation and swimmer's own voices to draw effective and embodied accounts from on and within water. … Swimming emerges from the study as a potentially valuable health and wellbeing resource that can be more fully harnessed to inform wider public health policy.

Foley, R., and T. Kistemann (2015) Blue space geographies: Enabling health in place. *Health & Place* 35: 157-165.

Drawing from research on therapeutic landscapes and relationships between environment, health and wellbeing, we propose the idea of 'healthy blue space' as an important new development. Complementing research on healthy green space, blue space is defined as; 'health-enabling places and spaces, where water is at the centre of a range of environments with identifiable potential for the promotion of human wellbeing'. Using theoretical ideas from emotional and relational geographies and critical understandings of salutogenesis, the value of blue space to health and wellbeing is recognised and evaluated. Six individual papers from five different countries consider how health can be enabled in mixed blue space settings. Four sub-themes; embodiment, inter-subjectivity, activity and meaning, document multiple experiences within a range of healthy blues paces. Finally, we suggest a considerable research agenda – theoretical, methodological and applied – for future work within different forms of blue space. All are suggested as having public health policy relevance in social and public space.

Garrett JK, White MP, Huang J, Ng S, Hui Z, Leung C, Tse LA, Fung F, Elliott LR, Depledge MH, Wong MCS. Urban blue space and health and wellbeing in Hong Kong: Results from a survey of older adults. Health Place. 2019 Jan;55:100-110. doi: 10.1016/j.healthplace.2018.11.003. Epub 2018 Dec 11. PMID: 30551994.

The potential benefits of aquatic environments for public health have been understudied in Asia. This study investigated the relationships between blue space exposures and health outcomes among a sample of predominantly older adults in Hong Kong. Those with a view of blue space from the home were more likely to report good general health, while intentional exposure was linked to greater odds of high wellbeing. Visiting blue space regularly was more likely for those within a 10-15 min walk, and who believed visit locations had good facilities and wildlife present. Longer blue space visits, and those involving higher intensity activities, were

associated with higher recalled wellbeing. Our evidence suggests that Hong Kong's blue spaces could be an important public health resource.

Gascon, M., W. Zijlemaa, C. Verta, M. P. Whited, and M. J. Nieuwenhuijsen (2017) Outdoor blue spaces, human health and well-being: A systematic review of quantitative studies. International Journal of Hygiene and Environmental Health http://dx.doi.org/10.1016/j.ijheh.2017.08.004

Background: A growing number of quantitative studies have investigated the potential benefits of outdoor blue spaces (lakes, rivers, sea, etc) and human health, but there is not yet a systematic review synthesizing this evidence.

Objectives: To systematically review the current quantitative evidence on human health and well-being benefits of outdoor blue spaces.

Methods: Following PRISMA guidelines for reporting systematic reviews and meta-analysis, observational and experimental quantitative studies focusing on both residential and non-residential outdoor blue space exposure were searched using specific keywords.

Results: In total 35 studies were included in the current systematic review, most of them being classified as of "good quality" (N =22). The balance of evidence suggested a positive association between greater exposure to outdoor blue spaces and both benefits to mental health and well-being (N=12 studies) and levels of physical activity (N =13 studies). The evidence of an association between outdoor blue space exposure and general health (N =6 studies), obesity (N= 8 studies) and cardiovascular (N= 4 studies) and related outcomes was less consistent.

Conclusions: Although encouraging, there remains relatively few studies and a large degree of heterogeneity in terms of study design, exposure metrics and outcome measures, making synthesis difficult. Further research is needed using longitudinal research and natural experiments, preferably across a broader range of countries, to better understand the causal associations between blue spaces, health and wellbeing.

Gesler, W. M. (1992). Therapeutic landscapes: medical issues in light of the new cultural geography. *Social Science & Medicine*, 34(7): 735-746.

This paper explores why certain places or situations are perceived to be therapeutic. One particular aspect of the physical environment that has been a source of healing for many societies is water.

Godfrey C., Devine-Wright H., Taylor J. (2015) The positive impact of structured surfing courses on the wellbeing of vulnerable young people. *Community Practitioner*, 88, 26.

Involvement in positive leisure activities is a key way for young people to develop resilience and social and emotional skills. This paper outlines the evaluation of a six-week surfing intervention, the Wave Project, which aimed to boost wellbeing and confidence among 84 young people aged eight to 18, all of whom faced mental health issues or social exclusion. The intervention resulted in a significant and sustained increase in wellbeing. One year later, 70% of clients regularly attend a surf club and many have become trained as session volunteers. Parents and referrers noticed an increase in positive attitude and better communication, as well as improved self-management and behaviour at both home and school It is concluded that the Wave Project provides a demonstrable and cost-effective way to deliver mental health care, mentoring and social integration of young people. Further service evaluation of accessibility and long-term outcomes is also recommended.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Grellier, J., White, M. P., Albin, M., Bell, S., Elliott, L. R., Gascón, M., …& Van Den Bosch, M. (2017). Bluehealth: A Study Programme Protocol For Mapping And Quantifying The Potential Benefits To Public Health And Well-Being From Europe's Blue Spaces. *BMJ Open*, *7*(6), E016188.

Proximity and access to water have long been central to human culture and accordingly deliver countless societal benefits. Over 200 million people live on Europe's coastline, and aquatic environments are the top recreational destination in the region. In terms of public health, interactions with 'blue space' (eg, coasts, rivers, lakes) are often considered solely in terms of risk (eg, drowning, microbial pollution). Exposure to blue space can, however, promote health and well-being and prevent disease, although underlying mechanisms are poorly understood.

The BlueHealth project aims to understand the relationships between exposure to blue space and health and well-being, to map and quantify the public health impacts of changes to both natural blue spaces and associated urban infrastructure in Europe, and to provide evidence-based information to policymakers on how to maximise health benefits associated with interventions in and around aquatic environments. (Ongoing Project, https://bluehealth2020.eu/)

Hunter, M. R., and A. Askarinejad. (2015) Designer's approach for scene selection in tests of preference and restoration along a continuum of natural to manmade environments. *Frontiers in Psychology* 6: 1228.

It is well-established that the experience of nature produces an array of positive benefits to mental well-being. Much less is known about the specific attributes of green space which produce these effects. In the absence of translational research that links theory with application, it is challenging to design urban green space for its greatest restorative potential. This research produced a systematic approach to meet the challenge of identifying which specific physical attributes of an environmental setting are most likely to influence preference and restoration responses.

Kahn, P. H., R. L. Severson, and J. H. Ruckert (2009) The human relation with nature and technological nature. *Current Directions in Psychological Science* 18(1): 37-42.

Does it matter for the physical and psychological well-being of the human species that actual nature is being replaced with technological nature? As the basis for our provisional answer (it is "yes"), we draw on evolutionary and cross-cultural developmental accounts of the human relation with nature and some recent psychological research on the effects of technological nature. Finally, we discuss the issue—and area for future research— of "environmental generational amnesia." The concern is that, by adapting gradually to the loss of actual nature and to the increase of technological nature, humans will lower the baseline across generations for what counts as a full measure of the human experience and of human flourishing.

Kalbfleisch, L., M. DeBettencourt, R. Kopperman, M. Banasiak, J. Roberts, and M. Halavi (2013) Environmental influences on neural systems of relational complexity. *Frontiers in Psychology* 4: 631.

Constructivist learning theory contends that we construct knowledge by experience and that environmental context influences learning. This experiment is a first step toward examining the psychophysical underpinnings of performance. The importance of this is increased in light of recent evidence that intelligence can be linked to visual discrimination. Color supports contextual sense-making by boosting salience resulting in faster problem solving. When visual complexity reaches 2-relations, color and visual contrast relinquish salience to other dimensions of problem solving.

Kim, S., S. Kaplowitz, and M.V. Johnston (2004) The effects of physician empathy on patient satisfaction and compliance. *Evaluation & the health professions*, *27*(3), 237-251.

Patient-perceived physician empathy significantly influenced patient satisfaction and compliance via the mediating factors of information exchange, perceived expertise, interpersonal trust, and partnership. Improving physician empathic communication skills should increase patient satisfaction and compliance.

Kuo, M. (2015) How might contact with nature promote human health? Promising mechanisms and a possible central pathway. *Frontiers in Psychology* 6: 1093.

The 21 pathways identified here include environmental factors, physiological and psychological states, and behaviors or conditions, each of which has been empirically tied to nature and has implications for specific physical and mental health outcomes. While each is likely to contribute to nature's impacts on health to some degree and under some circumstances, this paper explores the possibility of a central pathway by proposing criteria for identifying such a pathway and illustrating their use. A particular pathway is more likely to be central if it can account for the size of nature's impacts on health, account for nature's specific health outcomes, and subsume other pathways. By these criteria, enhanced immune functioning emerges as one promising candidate for a central pathway between nature and health.

Largo-Wight, E., B. K. O'Hara, & W. W. Chen (2016) The Efficacy of a Brief Nature Sound Intervention on Muscle Tension, Pulse Rate, and Self-Reported Stress: Nature Contact Micro-Break in an Office or Waiting Room. *Health Environments Research & Design Journal* Vol. 10(1): 45-51.

Background: There is a growing recognition that environmental design impacts health and well-being. Nature contact is a design feature or exposure that is especially important in public health and healthcare. To date, there are limited findings on the impact of nature sounds.

Objective: This experimental study was designed to examine the effect of nature sounds on physiological and psychological stress.

Methods: Participants were randomized into one of three groups-silence (n = 9), nature sound (n = 17), and classical music (n = 14) and listened to the assigned sound for 15 min in an office or waiting room-like environment. Pre- and postdata were collected including muscle tension (electromyogram), pulse rate, and self-reported stress.

Results: With the exception of pulse rate, there were no statistical differences in baseline or demographics among groups. A paired t-test by group showed a decrease in muscle tension, pulse rate, and self-reported stress in the nature group and no significant differences in the control or the classical music groups. The significant reduction in muscle tension occurred at least by 7 min of listening to the nature sound.

Conclusion: This study highlights the potential benefit of even very brief (less than 7 min) exposure to nature sounds. Brief nature sound "booster breaks" are a promising area for future research with important practical implications.

Laws, E. A., L. E. Fleming, & J. J. Stegeman (2008) Centers for oceans and human health: contributions to an emerging discipline. *Environmental Health* 7(2): 1.

Recognizing the growing need for interdisciplinary basic and applied research addressing the linkages between human health and the ocean, in 2004 the National Science Foundation (NSF) and the National Institute of Environmental Health Science (NIEHS) jointly funded grants establishing four Centers for Oceans and Human Health (COHH). These centers are: (i) the Oceans and Human Health Center at the University of Miami, (ii) the Pacific Research Center for Marine Biomedicine at the University of Hawaii, (iii) the Pacific Northwest Center for Human Health and Ocean Studies at the University of Washington, and (iv) the Woods Hole Center for Oceans and Human Health at the Woods Hole Oceanographic Institution, the Marine Biological Laboratory, and Massachusetts Institute of Technology. Through an internal competitive process, the National Oceanic and Atmospheric Administration (NOAA) in the same year designated three NOAA centers of excellence in oceans and human health under their Oceans and Human Health Initiative (OHHI): (i) the West Coast Center for Oceans and Human Health at the Northwest Fisheries Science Center in Seattle, Washington, (ii) the NOAA Center of Excellence in Oceans and Human Health at the Hollings Marine Laboratory in Charleston, South Carolina, and (iii) the NOAA Center of Excellence for Great Lakes and Human Health at the Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan. The NOAA initiative also includes external competitive grant, distinguished scholar, and traineeship programs.

MacIntyre, T. E., Walkin, M., Beckmann, J., Calogiuri, G., Gritzka, S., Oliver, G., Donnelly, A. A. & Warrington, G. (2019) An Exploratory Study of Extreme Sport Athletes' Nature Interactions: From Well-Being to Pro-environmental Behavior. Front. Psychology, 10, 1233. doi: 10.3389/fpsyg.2019.01233.

This study examining the lived experiences of extreme sportspeople provides a novel contribution to our contemporary understanding of extreme athletes' relationship to nature and its commensurate impact upon well-being and pro-environmental attitudes. The findings suggest that extreme sport participation, while inherently risky has psychological benefits ranging from evoking positive emotions, developing resilience and life coping skills to cultivating strong affinity to and connection with nature and the natural environment.

Marshall J, Kelly P, Niven A. "When I Go There, I Feel Like I Can Be Myself." Exploring ProgrammeTheory within the Wave Project Surf Therapy Intervention. Int J Environ Res Public Health. 2019 Jun 18;16(12):2159. doi: 10.3390/ijerph16122159. PMID: 31216775; PMCID: PMC6617262.

Mental health issues in young people are a priority for health and social care. Surf therapy is an innovative intervention that may help address this health burden globally. While increasing evidence demonstrates the effectiveness of surf therapy, there has been limited exploration as to how it achieves its outcomes. Such theoretical exploration is important for service optimisation, monitoring and proliferation. This research aimed to adopt, for the first time, a rigorous grounded theory approach to explore underlying programme theory within the Wave Project surf therapy intervention. Participants (n = 22, 14 males and 8 females; mean age = 14 years, SD = 3.5, range 8-23) were interviewed about their intervention experiences. Data were analysed through constant comparative analysis and memo writing. Two core categories reflected mediators by which surf therapy may achieve its outcomes: "Self-Selected Pacing and Progression While Surfing" and "Creation of Emotional and Physical Safe Space at Beach". Three antecedents (linking known inputs to core categories) and three consequent categories (linking core categories to associated outputs) were also identified. These demonstrate theorised pathways from known inputs to associated outcomes within the intervention. These important findings provide plausible evidence on how to optimise the Wave Project's delivery in tackling mental health burden.

Mishra, H S, S Bell, P Vassiljev, F Kuhlmann, G Niin, and J Grellier. 2020. "The Development of a Tool for Assessing the Environmental Qualities of Urban Blue Spaces." Urban Forestry & Urban Greening 49 (January): 126575. doi.org/10.1016/j.ufug.2019.126575

It is well established that outdoor natural environments - or green spaces - have the potential to serve as therapeutic landscapes and are a public health resource. Less is known about the extent to which "water-related environments (blue spaces) - may benefit health. As with green space, health benefits resulting from blue space

use probably depend on place quality. However, the lack of comparable environmental quality data hampers planning and design of blue spaces and their inclusion in public health-related policies.

This paper presents a novel tool - the BlueHealth Environmental Assessment Tool (BEAT) - which enables comparable assessment of environmental aspects and attributes that influence access to, use of and health-promoting activities in blue spaces. The tool is based on a review of published evidence and rigorous evaluation of 28 existing place assessment tools developed by and used in different disciplines including urban and transport planning, landscape architecture and management, urban design and public health.

The environmental attributes identified were assessed using a place affordance-affect scale based on their relevance to the interaction between the environment and human behaviour. This provided a framework for extracting those environmental variables especially relevant to blue spaces and for health determinants. These were incorporated into the BEAT as a set of domains each comprising several physical, social, aesthetic and environmental aspects.

The BEAT uses a questionnaire-based approach to examine each domain and aspect and to obtain both qualitative and quantitative measures using experience and judgment by either experts or stakeholders. The tool is freely available via an online interface featuring comprehensive guidance for assessors and a means of presenting results graphically. The tool can be used to compare sites before and after design interventions at a site. The BEAT enables rigorous and comparable assessment of the environment and strengthens the role of evidence-based planning in the development of urban blue spaces as a public health resource.

Moreton, Sam G, Brennan, Mary K, Nicholls, Victoria I, Wolf, Isabelle D, and Muir, David L. "Exploring Potential Mechanisms Underpinning the Therapeutic Effects of Surfing." Journal of Adventure Education and Outdoor Learning Ahead-of-print.Ahead-of-print: 1-18. Web.

The present article provides a review of potential causal mechanisms through which the therapeutic effects of surfing may emerge, with the aim to provide direction and impetus to further research into surfing-based therapies. It is hoped that this article will help researchers and practitioners design future surfing-based mental health interventions and test the relative contribution of these mechanisms.

Nutsford, D., A. L. Pearson, S. Kingham, and F. Reitsma (2016) Residential exposure to visible blue space (but not green space) associated with lower psychological distress in a capital city. *Health & Place* 39: 70–78.

Urban neighbourhood features which may improve physical and mental health are of growing importance. This study investigated whether increased visibility of nature (green and blue space) was associated with lower psychological distress in the capital city of Wellington, New Zealand. Higher levels of blue space visibility were associated with lower psychological distress. Further research is needed to confirm whether increased visibility of blue space could promote mental well-being and reduce distress in other cities.

Papathanasopoulou, E., M.P. White, C. Hattam, A. Lannin, A. Harvey, and A. Spencer (2015) Valuing the health benefits of physical activities in the marine environment and their importance for marine spatial planning. *Marine Policy* 63: 144-152.

The first attempt to put monetary values on the benefits to health from recreational activities in the marine environment including sailing, surfing, canoeing, etc. The importance of quantifying non-market benefits for marine spatial planning is highlighted and a standardized approach for valuing the health benefits of aquatic physical activities is developed. The potential savings by the national health service from individuals using the blue gym and an approach to informing cost-benefit analysis of marine plan options are presented.

Piff, P. K., M. Feinberg, P. Dietze, D. M. Stancato, and D. Keltner (2015) Awe, the small self, and prosocial behavior. *Journal of Personality and Social Psychology* 108(6): 883–899.

Awe arises in evanescent experiences, and involves positively valenced feelings of wonder and amazement. Although many stimuli can inspire awe, from beautiful buildings to elegant equations, the prototypical awe experience, at least in Western cultures, involves encounters with natural phenomena that are immense in size, scope, or complexity; perceptions of vastness that dramatically expand the observer's usual frame of reference in some dimension or domain (e.g., the night sky, the ocean). Many of the experiences people cherish most are triggers of the emotion we focused on here—awe. Our investigation indicates that awe, although often fleeting and hard to describe, serves a vital social function. Across several studies, awe was found to increase people's tendencies to be more kind, generous, ethical, and helping toward others. By diminishing the emphasis on the individual self, awe may encourage people to forego strict self-interest to improve the welfare of others.

Quoidbach J., J.Gruber, M. Mikolajczak, A. Kogan, I. Kotsou, and M.I. Norton (2014) Emodiversity and the emotional ecosystem. *Journal of Experimental Psychology* 143(6): 2057-66.

Bridging psychological research exploring emotional complexity and research in the natural sciences on the measurement of biodiversity, we introduce—and demonstrate the benefits of—emodiversity: the variety and relative abundance of the emotions that humans experience. Two cross-sectional studies across more than 37,000 respondents demonstrate that emodiversity is an independent predictor of mental and physical health—such as decreased depression and doctor's visits—over and above mean levels of positive and negative emotion. These results remained robust after controlling for gender, age, and the 5 main dimensions of personality. Emodiversity is a practically important and previously unidentified metric for assessing the health of the human emotional ecosystem.

Ramsey, S. (2018). The Effects of Living Water on Participants' Connection to Nature. Dissertation Retrieved by; https://pqdtopen.proquest.com/doc/2046877270.html?FMT=ABS&pubnum=10815090

In recent years a surge in research focused on the influences of water on humans. However, few have studied the effects of water on our relationship with nature, particularly to explore enduring impressions from a longitudinal perspective. Addressing these gaps, this qualitative exploratory research enlisted a case study methodology that employed multiple methods to investigate how a multi-day wilderness trip on the Tatshenshini River might affect participants' connection to nature and position toward a sustainable lifestyle. The 12 participants were administered the Kellert Shorb Biophilic Indicator (KSBVI) questionnaire prior to the trip and reflected in journals during the experience. Six months after the trip ended a survey was administered. After 16 months, in-depth interviews were conducted. The results suggest that immersion into river time, an experience conceptualization that connected participants to nature's rhythm, generally equated with a flow state and a condition of blue mind, positively influenced their connection to nature. It appears that living water in concert with awe-inspiring encounters in the natural world enhanced and affirmed participants' position toward a sustainable lifestyle. Furthermore, this multi-day wilderness experience seemed to inform their orientation toward sustainability. The findings suggest that further research into the lasting effects of river time and awe within these types of contexts is warranted.

Sandifer, P. A., and A. E. Sutton‐Grier (2014) Connecting stressors, ocean ecosystem services, and human health. Natural Resources Forum 38(3): 157-167.

Ocean and coastal ecosystems provide many critical ecosystem services that support human health and well-being including providing food, storm protection, and carbon sequestration. Environmental stressors acting individually or concurrently and synergistically are reducing the ability of coastal ecosystems to provide key

ecosystem services that may result in decreases in human health and well-being. This article outlines some impacts to human health and well-being that may result from the effects on coastal and ocean ecosystem services of five example stressors: rising temperatures, nutrient enrichment, ocean acidification, habitat destruction and the concomitant loss of biodiversity, and extreme weather events. Research and related actions to improve our understanding and management of coastal ecosystems include the need for natural and biomedical/public health scientists, and their respective professional organizations, to work together to increase understanding of the connections between healthy and degraded coastal and marine ecosystems and human health, and for policy and decision-makers to account for these impacts when considering trade-offs among management alternatives.

Schitter, A. M., M. Nedeljkovic, H. Baur, J. Fleckenstein, and L. Raio (2015) Effects of passive hydrotherapy WATSU (WaterShiatsu) in the third trimester of pregnancy: results of a controlled pilot study. *Evidence-Based Complementary and Alternative Medicine*, 2015. Chicago.

WATSU [WaterShiatsu] *is a complementary therapeutic treatment method comprising passive stretches and massage techniques administered in 35°C warm water. Pregnant women claim safe methods to reduce pain, stress, and fatigue. Therefore, a pilot study was conducted evaluating the effects of WATSU on pregnancy-related complaints in third trimester pregnant women. WATSU was found to significantly lower participants' levels of stress and pain and to improve their mental health-related quality of life and mood. In comparison to the passive control group, participants in the intervention group reported reduction in perceived stress from day 1 to day 8 (P = 0.036, Cohen's f = 0.57). Qualitative data indicate that WATSU was appreciated as enjoyable and deeply relaxing. No negative side effects were reported. Our findings support the notion that WATSU yields therapeutic benefits for pregnant women and warrant further research.*

Shriver, A. L., L. Y. Cabrera and J. Illes (2017) Environmental Neuroethics: Bridging Environmental Ethics and Mental Health, *The American Journal of Bioethics* 17:9, 26-27.

Environmental neuroethics examines the many ways in which anthropogenic influences on the environment affect brain health and mental well-being. It builds upon the field of neuroethics that situates ethical, legal, policy and social considerations alongside technological developments in neurosciences. The term "neuroethics" was initially used by William Safire to refer to ethical issues associated with the "treatment and enhancement of the human brain" (Marcus 2002), but the field has expanded in scope as it has become increasingly clear that the changing understanding of the brain is having a profound influence on many aspects of human life. As such, the field of neuroethics is responsive to the ways in which an evolving understanding of the brain interacts with the transformative processes shaping the future. There is little doubt, moreover, that the impact that humans are having on the environment is one of those transformative processes of our time. Discussions of the ethical and societal consequences of environmental change for brain and mental health have thus far been limited, but given the vulnerability of the central nervous system to environmental factors, the time is now for the field of public health to embrace the topic.

Straughan, E.R. (2012) Touched by water: the body in scuba diving. *Emotion, Space and Society* 5.1.

The paper positions itself within the conceptual context of embodiment in order to consider corporeality in terms of its visceral and material capacities that effect and direct movement, as well as the experience of the sensuous via an engagement with the diving environment. In doing so, it draws upon work within the social sciences that has acknowledged the importance of an embodied engagement with environments that are seen as therapeutic or restorative for their ability to instill a sense of well-being and calm through a re-centering of the self. Drawing out the meditative capacities of scuba diving, the paper considers the aquatic world as, for some divers, a therapeutic landscape.

Stuhl, Amanda & Porter, Heather. (2015). Riding the waves: Therapeutic surfing to improve social skills training in children with autism. Therapeutic recreation journal. 49. 253-256.

Children with autism may have difficulties forming and maintaining meaningful relationships with their peers. These difficulties can lead to social isolation and can impact their social, emotional and cognitive development; academic achievements; and self-esteem. Thus, it is important to have children with autism involved in interventions that utilize the proper techniques to effectively teach social skills, such as therapeutic surfing camps. This literature review highlights three different surfing programs including participants with varying levels of developmental disabilities and behavioral problems. The programs taught participants the physical skills necessary to surf then utilized group activities, socials, and self-reflection to promote interactions and build social skills with peers and staff. Overall, the surfing camps resulted in significant outcomes for assertion and empathy on the Social Skills Improvement System–Parent Report; responsibility and engagement on the Social Skills Improvement–Student Report; and, positive functioning, emotional wellbeing, resilience, self-esteem, vitality, friendship, social trust, physical health, and enjoyment in the outside environment.

Tanja-Dijkstra, K., S. Pahl, M. P. White, M. Auvray, R. J. Stone, J. Andrade, J. May, I Mills and D. R. Moles (2017) The Soothing Sea: A virtual coastal walk can reduce experienced and recollected pain. Environment and Behavior 1-27.

Virtual reality (VR) distraction has become increasingly available in health care contexts and is used in acute pain management. However, there has been no systematic exploration of the importance of the *content* of VR environments. Two studies tested how interacting with nature VR influenced experienced and recollected pain after 1 week. Study 1 (n = 85) used a laboratory pain task (cold pressor), whereas Study 2 (n = 70) was a randomized controlled trial with patients undergoing dental treatment. In Study 1, nature (coastal) VR reduced both experienced and recollected pain compared with no VR. In Study 2, nature (coastal) VR reduced experienced and recalled pain in dental patients, compared with urban VR and standard care. Together, these data show that nature can improve experience of health care procedures through the use of VR, and that the content of the VR matters: Coastal nature is better than urban.

Thomas F. The role of natural environments within women's everyday health and wellbeing in Copenhagen, Denmark. Health Place. 2015 Sep;35:187-95. doi: 10.1016/j.healthplace.2014.11.005. PMID: 25435057.

Urbanisation has been linked with sedentary lifestyles and poor mental health outcomes amongst women. The potential for natural environments to enhance physical activity and mental wellbeing in urban areas is now well recognised. However, little is known about the ways that women use natural spaces for health and wellbeing within the context of their everyday lives. This paper draws on ideas developed in the therapeutic landscapes literature to examine how experiences in different types of green and blue space provide important health and wellbeing benefits for women in Copenhagen, Denmark. As well as facilitating physical exercise, such spaces were found to enable a range of more subtle benefits that helped to restore mental wellbeing through stress and anxiety alleviation, the facilitation of emotional perspective, clarity and reassurance, and through the maintenance of positive family dynamics. However, amongst some women who were overweight, the socio-political associations they made with natural environments deterred use of such spaces. Such findings challenge dominant planning and policy assumptions that equate open public access to natural spaces with universal benefit.

Völker, S., and T. Kistemann (2011) The impact of blue space on human health and well-being–Salutogenetic health effects of inland surface waters: A review. *International Journal of Hygiene and Environmental Health*, *214*(6): 449-460.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Water is one of the most important physical, aesthetic landscape elements and possesses importance e.g. in environmental psychology, landscape design, and tourism research, … the aim of this review is to provide a systematic, qualitative meta-analysis of existing studies that are relevant to this issue. Benefits for health and well-being clearly related to blue space can be identified with regard to perception and preference, landscape design, emotions, and restoration and recreation. Additionally, direct health benefits have already been stated. The studies included in the review are mostly experimental studies or cross-sectional surveys, focusing on students as the subject group.

Völker S., and T. Kistemann (2013) “I'm always entirely happy when I'm here!” Urban blue enhancing human health and well-being in Cologne and Düsseldorf, Germany. *Social Science & Medicine* 78:113-24

Water is one of the most important landscape elements. In settled areas, planners rediscovered urban blue in the form of rivers as a soft location factor in post-industrial times. Although the recognition of the need for recreational or 'healthy' places like urban green or urban blue in cities is increasing, current urban planning is mostly conducted without taking beneficial health issues into account. In this paper an extended concept of therapeutic landscapes is used to analyse two promenades on the river Rhine in the centres of two German cities (Cologne and Düsseldorf). A complex of qualitative and quantitative methods from diverse disciplines is applied to obtain a multi-dimensional image of salutogenic health processes. The results show that the promenades are favourite places to spend leisure time and to engage in recreational activities, in addition to providing restoration from everyday stresses. Water is a strong predictor of preference and positive perceptive experiences in urban environments. Users of the promenades also report strong emotional attachments to the place. Urban blue space may be interpreted as a therapeutic landscape in various ways. The study forms a contribution to planning issues, particularly considering benefits for human health, and enhances current research concerning therapeutic landscapes.

Völker, S., and T. Kistemann (2014) Developing the urban blue: Comparative health responses to blue and green urban open spaces in Germany. *Health & Place* 35: 196–205.

Recently, new perspectives upon healthy urban open spaces propose that open spaces can be regarded as urban green or blue spaces. However, there has so far been very little research into blue environments and their benefits for mental well-being. Our article focuses on the effects of water in cities, “urban blue” (as compared to “urban green”), on human health and well-being. Although similarities were found, some health-enhancing effects for users turned out to be prominent for urban blue in the four conceptual therapeutic landscape dimensions: experienced, symbolic, social and activity space. These effects include enhanced contemplation, emotional bonding, participation, and physical activity. The results suggest that urban blue as a health-promoting factor needs more detailed and accurate determination and examination of its general and local health-enhancing effects.

Völker, S., J. Matros, and T. Claßen (2016) Determining urban open spaces for health-related appropriations: a qualitative analysis on the significance of blue space. *Environmental Earth Sciences*, 75: 1067.

Blue space can be regarded as a key component of urban development as it contributes to sustainability, landscape contextualisation, environmental quality, quality of life and human health. However, existing studies on urban blue spaces do not differentiate between size and type of space and do not explain the mechanisms of how urban blue spaces interact with appropriations that affect health. In our study, we chose seven urban open spaces in Germany with different types of urban blue (in the cities of Bielefeld, Gelsenkirchen, Dusseldorf, Cologne). We conducted standardised qualitative interviews with n = 211 urban blue space visitors, assessing their health-related appropriations of those spaces (use, experience, social, meaning). Via Correspondence Analysis, we profiled these seven spaces. Our results show that blue experience is an important appropriation in urban open spaces. The amount of green and blue space has a significant influence on health-related appropriative processes. Health-related appropriations shift with the profile of the blue urban open space and the proportion of

land the blue space covers. Even in cities with few water features, urban blue induces intensive (restorative) experiences, creates meaning, attracts urban dwellers, promotes physical activity, and diversifies health experiences in urban contexts. We identify implications for public health, urban planning and landscape design. This paper is a valuable contribution to the current research trend in Germany to analyse the significance for human health and well-being of bodies of water in urban areas.

Walsh, R. 2011. Lifestyle and mental health. *American Psychologist* 66(7): 579–592.

Mental health professionals have significantly underestimated the importance of lifestyle factors (a) as contributors to and treatments for multiple psychopathologies, (b) for fostering individual and social well-being, and (c) for preserving and optimizing cognitive function. Consequently, therapeutic lifestyle changes (TLCs) are underutilized despite considerable evidence of their effectiveness in both clinical and normal populations. TLCs are sometimes as effective as either psychotherapy or pharmacotherapy and can offer significant therapeutic advantages. Important TLCs include exercise, nutrition and diet, time in nature, relationships, recreation, relaxation and stress management, religious or spiritual involvement, and service to others. This article reviews research on their effects and effectiveness; the principles, advantages, and challenges involved in implementing them; and the forces (economic, institutional, and professional) hindering their use. Where possible, therapeutic recommendations are distilled into easily communicable principles, because such ease of communication strongly influences whether therapists recommend and patients adopt interventions. Finally, the article explores the many implications of contemporary lifestyles and TLCs for individuals, society, and health professionals. In the 21st century, therapeutic lifestyles may need to be a central focus of mental, medical, and public health.

Wheaton B, Waiti JTA, Olive R, Kearns R. Coastal Communities, Leisure and Wellbeing: Advancing a Trans-Disciplinary Agenda for Understanding Ocean-Human Relationships in Aotearoa New Zealand. Int J Environ Res Public Health. 2021 Jan 8;18(2):450. doi: 10.3390/ijerph18020450. PMID: 33429986; PMCID: PMC7827343.

Commentators are advocating for research to better understand relationships between healthy coastal ecosystems and human wellbeing. Doing so requires inter- and transdisciplinary approaches across humanities, arts, social sciences, and science and technology disciplines. These approaches include culturally diverse knowledge systems, such as indigenous ones, that locate sustainable use of and relationships to marine ecosystems. This paper contributes to this agenda through a case-study of relationships between coastal ecosystems and human wellbeing in Aotearoa New Zealand. This article highlights interconnected cultural and wellbeing benefits of, and socio-ecological relationships between, these coastal ecosystems drawing on a case study of one ocean-based, 'immersive' leisure activity, surfing. Further, it examines how these relationships impact human physical, emotional and spiritual wellbeing, and the wellbeing of communities and ecosystems. The research illustrates that surfing creates strong bonds between practitioners and coastal places, linking the health of marine environments and people. We demonstrate the value of a transdisciplinary place-based approach that integrates research across the humanities and social sciences and engages with Indigenous knowledge (Mātauranga Māori). This argument for multicultural co-learning shows the value of Western and Māori vantage points for how we understand coastal blue spaces. Indigenous perspectives, we conclude, deepen appreciation, as well as equity considerations, of how we understand place, wellbeing, and long-term sustainable relationships with marine ecosystems.

Wheeler, B. W., M. White, W. Stahl-Timmins, and M. H. Depledge (2012) Does living by the coast improve health and wellbeing? *Health & Place*,*18*(5): 1198-1201.

This study analysed small-area census data for the population of England, which indicated that good health is more prevalent the closer one lives to the coast. It also found that, consistent with similar analyses of greenspace accessibility, the positive effects of coastal proximity may be greater amongst more socio-economically deprived

communities. The authors hypothesise that these effects may be due to opportunities for stress reduction and increased physical activity.

White, M., A. Smith, K. Humphryes, S. Pahl, D. Snelling, and M. Depledge (2010) Blue space: The importance of water for preference, affect, and restorativeness ratings of natural and built scenes. *Journal of Environmental Psychology* 30(4): 482–493.

Both natural and built scenes containing water were associated with higher preferences, greater positive affect, and higher perceived restorativeness than those without water. Effect sizes were consistently large. Intriguingly, images of "built" environments containing water were generally rated just as positively as natural "green" space. We propose a number of avenues for further research including exploration of the mechanisms underlying these effects.

White, M. P., Elliott, L. R., Gascon, M., Roberts, B., & Fleming, L. E. (2020). Blue space, health and well-being: A narrative overview and synthesis of potential benefits. *Environmental research*, *191*, 110169. https://doi.org/10.1016/j.envres.2020.110169

Research into the potential health and well-being benefits from exposure to green spaces such as parks and woodlands has led to the development of several frameworks linking the different strands of evidence. The current paper builds on these to provide a model of how exposure to aquatic environments, or blue spaces such as rivers, lakes and the coast, in particular, may benefit health and well-being.

White, M. P., I. Alcock, B. W. Wheeler, and M. H. Depledge (2013) Coastal proximity, health and well-being: Results from a longitudinal panel survey. *Health & Place* 23: 97-103.

The association between self-reported health and coastal proximity was examined. Panel data was used to control for individual level time-invariant heterogeneity. Individuals reported significantly better health when they lived nearer to the coast. The effects were present for both general and mental health. While individual effects were small, they may be important at the community level.

White, M. P., S. Pahl, K. Ashbullby, S. Herbert, and M. H. Depledge (2013) Feelings of restoration from recent nature visits. *Journal of Environmental Psychology* 35 40–51.

Exposure to natural environments can help restore depleted emotional and cognitive resources. However, investigation of the relative impacts of different natural environments among large samples is limited. Using data from 4255 respondents drawn from Natural England's Monitoring Engagement with the Natural Environment survey (2009–2011), this study investigated feelings of restoration (calm, relaxed, revitalized and refreshed) recalled by individuals after visits to different natural environments within the last week. Controlling for demographic and visit characteristics, it was found that of the broad environmental categories, coastal visits were associated with the most restoration and town and urban parks with the least. In terms of specific environmental types two "green space" locations (woodlands/forests and hills/moorland/mountains) were associated with levels of restoration comparable to coastal locations. Urban playing fields were associated with the least restoration. Restoration was positively associated with visit duration (a potential dose–response effect), and visits with children were associated with less restoration than visits alone. There was little evidence that different activities (e.g. walking, exercising) were associated with differences in restoration. The data may improve our understanding of the "cultural ecosystem services" provided by different natural environments and help decision makers keen to invest scarce resources in those environments most associated with psychological benefits.

White, M.P., S. Pahl, K. L. Ashbullby, F. Burton, and M. H. Depledge (2015) The effects of exercising in different natural environments on psycho-physiological outcomes in post-menopausal women: A simulation study. *International Journal of Environmental Research and Public Health* 12: 11929-11953.

The current study examined potential psycho-physiological benefits from exercising in simulated natural environments among a sample of post-menopausal women using a laboratory based protocol. Participants cycled on a stationary exercise bike for 15 min while facing either a blank wall (Control) or while watching one of three videos: Urban (Grey), Countryside (Green), Coast (Blue). Blood pressure, heart rate and affective responses were measured pre-post. Heart rate, affect, perceived exertion and time perception were also measured at 5, 10 and 15 min during exercise. Experience evaluation was measured at the end. Replicating most earlier findings, affective, but not physiological, outcomes were more positive for exercise in the simulated Green and, for the first time, Blue environment, compared to Control. Moreover, only the simulated Blue environment was associated with shorter perceived exercise duration than Control and participants were most willing to repeat exercise in the Blue setting. The current research extended earlier work by exploring the effects of "blue exercise" and by using a demographic with relatively low average levels of physical activity. That this sample of postmenopausal women were most willing to repeat a bout of exercise in a simulated Blue environment may be important for physical activity promotion in this cohort.

White, M.P., S. Pahl, B.W. Wheeler, L. E. F. Fleming, M.H. Depledge (2016) The 'Blue Gym': What can blue space do for you and what can you do for blue space? *Journal of the Marine Biological Association* 96: 5-12.

The Blue Gym Initiative was created in the UK in 2009 to explore: (1) whether blue space environments might be positively related to human health and well-being; and (2) whether the public could be encouraged to preserve and protect these environments. Whilst the wider initiative considers all blue spaces including inland bodies of water (e.g. lakes, rivers and canals as well as the coasts and the ocean), to date the focus has been primarily on marine and coastal environments. An important early finding was the observation that individuals living near the coast are generally healthier and happier than those living inland; much subsequent work has tried to understand why this might be. A more recent focus has been on how to promote pro-marine behaviours (e.g. sustainable fish choice, reduction of plastic use, avoidance of littering). This strand is still very much work in progress but highlights the importance of understanding public awareness, values and attitudes and the power of visualization in communicating the marine sustainability issues.

Wood, S.L., P. R. Demougin, S. Higgins, K. Husk, B. W. Wheeler, and M. P. White (2016) Exploring the relationship between childhood obesity and proximity to the coast: A rural/urban perspective. *Health & Place* 40: 126-136.

Childhood obesity is one of the 21st century's most serious global health challenges. Research suggests that better access to 'greenspace' (e.g. parks) may encourage physical activity and reduce the risk of obesity amongst children. This article extends earlier work by considering childhood obesity in relation to proximity to the coast, using data from England's National Child Measurement Programme. On average, children who live near the coast have lower odds of obesity. Coastal environments and access to them are changing in many areas, and research to explore potential impacts on child health is warranted.

Wyles, K.J., S. Pahl, and R. C. T. Thompson (2015) Factors that can undermine the psychological benefits of coastal environments: exploring the effect of tidal state, presence and type of litter. *Environment and Behavior* 1-32.

Using both quantitative and qualitative methods, it was shown that litter can undermine the psychological benefits that the coast ordinarily provides, thus demonstrating that, in addition to environmental costs of marine litter, there are also costs to people. Litter stemming from the public had the most negative impact. This research extends our

understanding of the psychological benefits from natural coastal environments and the threats to these benefits from abundant and increasing marine litter.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Selected *Blue Mind* Books & Reports

Amateur Swimming Association (2010) *Swimming: Taking the Plunge for a Fitter Lifestyle*. Reprinted 2014. www.swimming.org/library/documents/143/download

Swimming has the capacity to unite communities and bring about considerable economic benefits to the healthcare system, but to achieve this there needs to be more coherence between all agencies...The ASA wants to encourage wider and greater lifelong participation by utilising new channels for swimming. A typical example of this is the previously mentioned Outdoor Swimming Society and Blue Gyms which encourage 'wild swimming' and watersports in natural environments such as lakes and rivers throughout the country. It seeks to capture the joys of swimming under an open sky. We see this type of participation as part of a new drive towards smaller groups of people swimming together.

Beatley, T. (2014) *Blue Urbanism: Exploring Connections Between Cities & Oceans*. Island Press, Washington, D.C.

What would it mean to live in cities designed to foster feelings of connectedness to the ocean? In Blue Urbanism*, Beatley argues that, given all we've gained from the sea, city policies, plans, and daily urban life should acknowledge and support a healthy ocean environment. Urban citizens have many opportunities to interact meaningfully with the ocean, from beach cleanups to helping scientists gather data. Ultimately he explains we must create a culture of "ocean literacy" using a variety of approaches, from building design and art installations that draw inspiration from marine forms, to encouraging citizen volunteerism related to oceans, to city-sponsored research, and support for new laws that protect marine health.* Blue Urbanism *offers a comprehensive look at the challenges and great potential for urban areas to integrate ocean health into their policy and planning goals.*

Britton, E. (2021) *Saltwater in the Blood: Surfing, Natural Cycles and the Sea's Power to Heal.* Watkins Publishing.

Powerful feminist nature writing by the pioneer of women's big-wave surfing in Ireland. Easkey Britton provides a rare female perspective on surfing, exploring the mental skills it fosters, and the need to recognize the value of the ocean and of nature's cycles in our lives.

Cracknell, D. (2019) *By the Sea: The therapeutic benefits of being in, on and by the water.* Aster.

In this stunning book, intuition and instinct meet modern science as the therapeutic benefits of being in, on or by the sea are explained and explored, and how, if we look after the oceans they will in turn look after us.

The unfathomable vastness of the oceans, significantly larger than the continents combined, and brimming with strange sounds and sensations, seems to beckon to humans in a deep-seated way. Throughout history, people have always gravitated to live near the sea, it is part of the survival instinct. Water also has huge cultural and spiritual significance for people through the ages and for centuries we looked to the sand and surf as a fully-stocked pharmacy.

Despite the widespread intuitive feeling that being by the sea makes us happier and healthier, there hasn't been much scientific evidence to quantify this connection. Until now. Environmental psychology is the study of how the natural environment makes us feel, think and behave, and scientists in this area are discovering the tangible benefits of breathing in the fresh sea air.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Reasons to spend time by the sea:

1. Just looking at the sea can promote reductions in heart rate and improvements in mood.
2. The negative ions in sea air accelerate your ability to absorb oxygen, and balance your seratonin levels.
3. The bracing climate is especially beneficial to the respiratory organs and the skin, and also improves circulation and strengthens the body's defences.
4. Spending time by the sea promotes better mental health.
5. When you are by the sea you are more likely to exercise.

Crawford, R. T. (2017) *The Impact of Ocean Therapy on Veterans with Posttraumatic Stress Disorder.* Independently Published.

Based on Crawford's doctoral dissertation research, the book discusses scientific research that demonstrates ocean therapy's ability to increase self-efficacy, reduce Posttraumatic Stress Disorder (PTSD) symptoms, and reduce depression among veterans with PTSD in the United States.

Louv, R. (2016) *Vitamin N: The Essential Guide to a Nature-Rich Life*. Algonquin Books, Chapel Hill.

Vitamin N (for "nature") is a complete prescription for connecting with the power and joy of the natural world right now, with 500 activities for children and adults, dozens of inspiring and thought-provoking essays, scores of informational websites, and down-to-earth advice.

Nichols, W.J. (2014) *Blue Mind*. Little, Brown & Company, New York.

Blue Mind *illustrates the crucial importance of our connection to water and provides a paradigm shifting "blueprint" for a better life on this 'blue marble' we call home.*

Sapolsky, R. (2004) *Why Zebras Don't Get Ulcers*, Third Edition. Henry Holt and Company, New York.

When we worry or experience stress, our body turns on the same physiological responses that a [non-human] animal does, but we [often] do not resolve conflict in the same way—through fighting or fleeing. Over time, this activation of a stress response makes us literally sick. Combining cutting-edge research with practical advice, Sapolsky explains how prolonged stress causes or intensifies a range of physical and mental afflictions, including depression, ulcers, colitis, heart disease, and more. It also provides essential guidance to controlling our stress responses.

Selhub, E.M., and A. C. Logan (2012) *Your Brain On Nature*. Jon Wiley & Sons, Canada.

Scientific studies have shown that natural environments can have remarkable benefits for human health. Natural environments are more likely to promote positive emotions; and viewing and walking in nature have been associated with heightened physical and mental energy. Nature has also been found to have a positive impact on children who have been diagnosed with impulsivity, hyperactivity, and attention-deficit disorder.

Swim England (2017) *Swim England Response to the Health and Wellbeing Benefits of Swimming report.*

Swim England welcomes the recommendations in the report and is keen to work with the authors and wider partners to support additional and more robust research to maximise the potential that swimming can contribute to the health agenda….[Swim England states that the Health and Wellbeing report] provides a good platform to help shape the future direction of Swim England's health and wellbeing work. It also highlights the need to continue to ensure high quality facilities are available that create the right environment and a tailored offer supported by a highly trained, diverse workforce. By doing this, Swim England believes swimming will become a more attractive, safe and effective service to which general practitioners and other health practitioners will be confident in signposting their patients.

Tsui, B. (2020) *Why We Swim*. Algonquin Books.

We swim in freezing Arctic waters and piranha-infested rivers to test our limits. We swim for pleasure, for exercise, for healing. But humans, unlike other animals that are drawn to water, are not natural-born swimmers. We must be taught. Our evolutionary ancestors learned for survival; now, in the twenty-first century, swimming is one of the most popular activities in the world.

Why We Swim is propelled by stories of Olympic champions, a Baghdad swim club that meets in Saddam Hussein's palace pool, modern-day Japanese samurai swimmers, and even an Icelandic fisherman who improbably survives a wintry six-hour swim after a shipwreck. New York Times contributor Bonnie Tsui, a swimmer herself, dives into the deep, from the San Francisco Bay to the South China Sea, investigating what it is about water that seduces us, despite its dangers, and why we come back to it again and again.

Williams, F. (2017) *The Nature Fix: Why Nature Makes Us Happier, Healthier, and More Creative.* W.W. Norton & Company.

For centuries, poets and philosophers extolled the benefits of a walk in the woods: Beethoven drew inspiration from rocks and trees; Wordsworth composed while tromping over the heath; and Nikola Tesla conceived the electric motor while visiting a park. Intrigued by our storied renewal in the natural world, Florence Williams set out to uncover the science behind nature's positive effects on the brain.

In this informative and entertaining account, Williams investigates cutting-edge research as she travels to fragrant cypress forests in Korea to meet the rangers who administer "forest healing programs," to the green hills of Scotland and its "ecotherapeutic" approach to caring for the mentally ill, to a river trip in Idaho with Iraqi vets suffering from PTSD, to the West Virginia mountains where she discovers how being outside helps children with ADHD. The Nature Fixdemonstrates that our connection to nature is much more important to our cognition than we think and that even small amounts of exposure to the living world can improve our creativity and enhance our mood. In prose that is incisive, witty, and urgent, Williams shows how time in nature is not a luxury but is in fact essential to our humanity. As our modern lives shift dramatically indoors, these ideas—and the answers they yield—are more urgent than ever.

Why Endorse The Blue Mind Movement?

A concise guide for curious newbies and talking points for introducing the statement to healthcare practitioners

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

- **Many patients are looking towards less invasive, complementary, and non-pharmaceutical solutions**. The more doctors and practitioners can offer in this arena, the more patients they will be able to serve effectively.

- The peer-reviewed literature section bolsters support for physicians who want to provide their patients with a broader range of options—**affordable and effective options**.

- When a patient feels that their doctor has empathy towards them, healing rates increase. Talking about and offering ***Blue Mind* is an opportunity to connect empathetically with patients**.

- **By endorsing**, a patient who knows about *Blue Mind* and wants to find a doctor who can support them in using nature/wild water in their personalized treatment may be more inclined to choose you.

- **As an endorser**, you are part of a united, transdisciplinary voice that advocates for patient well-being and for conservation that will continue to support such therapies into the future.

- **Endorsements of *Blue Mind* help to normalize** the understanding of the relationship between our human health and healthy wild waters, and help set the tone for widespread acceptance and application of these concepts in health care, ranging from prenatal and pediatric to end-of-life and hospice care.

- **Endorsements of *Blue Mind* will encourage research** into ways the medical field can refine the use of wild waters as medicine, so that treatment plans can be even more strategic in the future.

When you have discussions with physicians, we would love to hear what —if any— push-back you encounter. Likewise, if you are a physician, please let us know of any questions you may have. This dialogue will help us to keep in the loop of what the concerns are and will help us to add any literature to the document that may help answer those questions.

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

The *Blue Mind Movement* Press & Media Kit

Videos:

Resurface documentary film trailer
Between Two Harbors documentary film trailer
Blue Mind Health docuseries

Press:

Milwaukee Journal Sentinel: Melania Trump connects nature and public health
Washington Post: Health & Science, 'Blue Mind' explores the calming effect that water has on people
Duke Magazine: An Alumnus Makes a Watertight Argument
New York Times:Veterans swimming with whale sharks as part of PTSD therapy

Sample Tweets:

100+ leaders endorse #BlueMind changing conversations about #OurOcean for good #Bluescription #WaterIsMedicine getbluemind.com

#OurOcean provides ecological, economic, educational & emotional value #WaterIsMedicine #BlueMind getbluemind.com

Over 100 leading doctors, researchers & organizations agree #WaterIsMedicine #OurOcean #BlueMind getbluemind.com

@getbluemind #BlueMind #WaterIsMedicine #ElAguaEsMedicina

The *Blue Mind* Therapy: Our Waters Can Be Lifelong Medicine for All People

Acknowledgements

Thank you to Natalie Luka Spear and Wallace J. Nichols for their co-authorship of the original English version of the statement, Manuel Maqueda for providing the Spanish translation, Paola Bonfanti for the Italian translation, and April Denny for updating the literature.