

National Park Service

Intersection of Nature & Mental Health



Agenda

01 Speaker Introductions

02 Speaker Presentations

03 Panel Discussion

04 Questions

Speaker Introductions



Vaile Wright

Senior Director of Health Care
Innovation
(American Psychological Association)



Allison Colman

Director of Health
(National Recreation and Park
Association)



Keith Tidball

Senior Extension Associate
(Department of Natural Resources
& the Environment, Cornell
University)

State of Mental Health in the US: Who is impacted, why, and what can we do about it?

Vaile Wright, PhD

Senior Director, Health Care Innovation

American Psychological Association

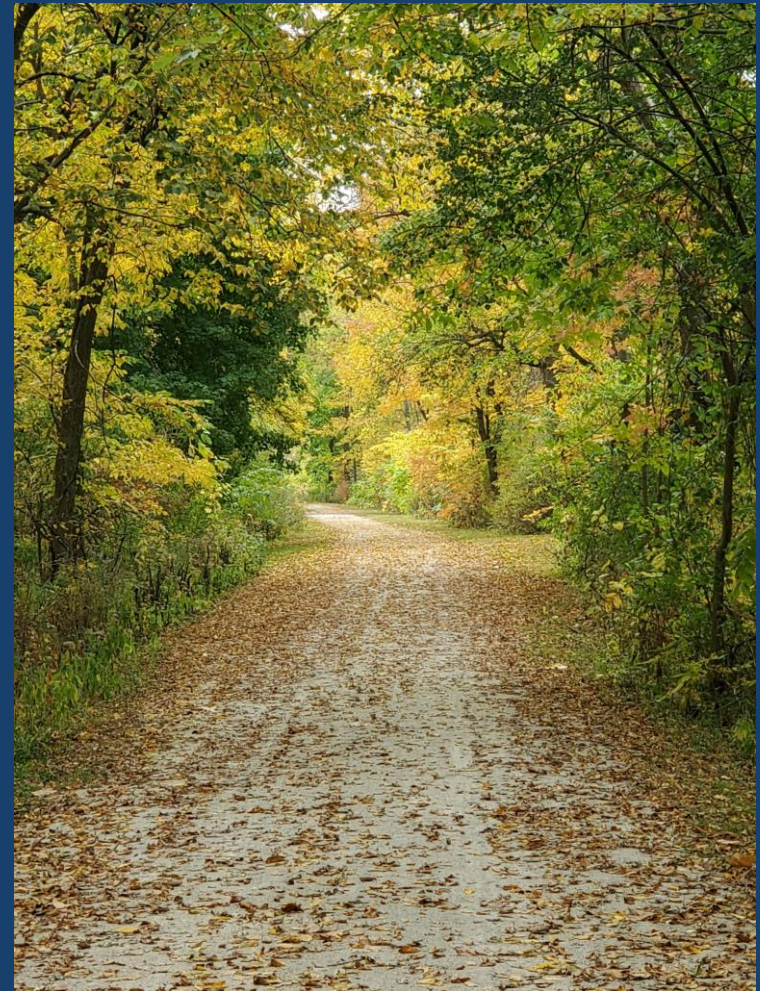
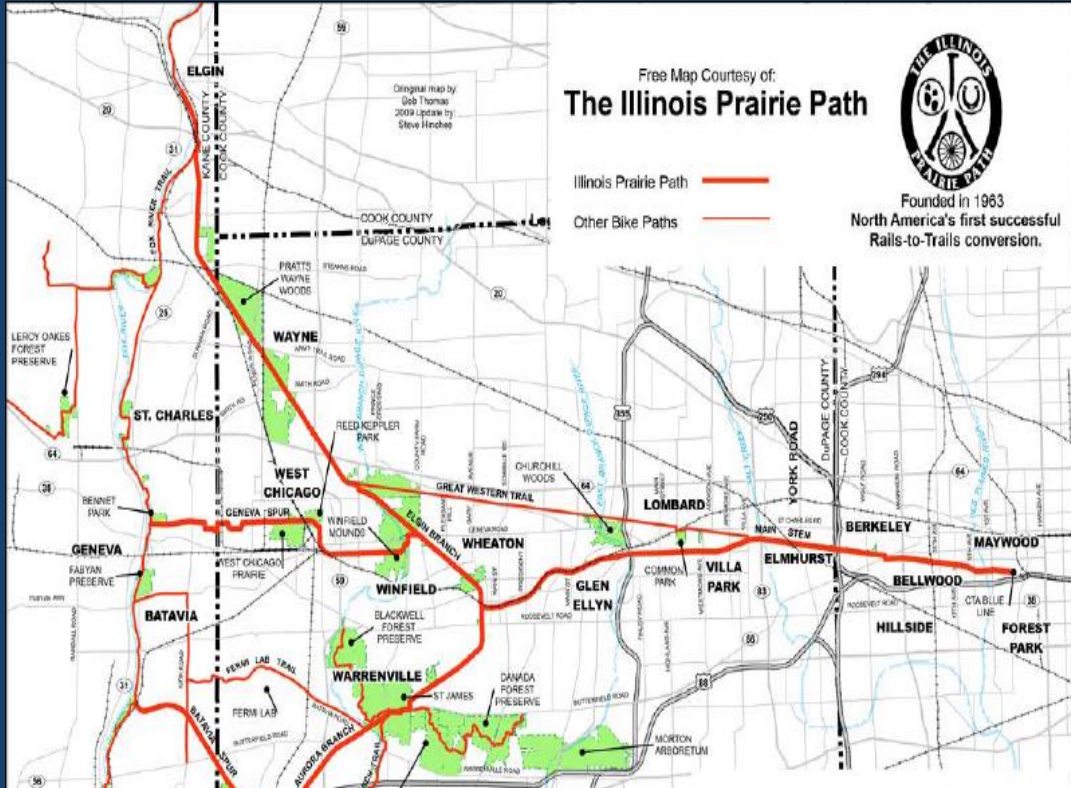


**AMERICAN
PSYCHOLOGICAL
ASSOCIATION**

• March 23, 2023

National Park Service







health

Life, But Better

Fitness

Food

Sleep

Mindfulness

Relationships

90% of US adults say the United States is experiencing a mental health crisis, CNN/KFF poll finds

By Deidre McPhillips, CNN

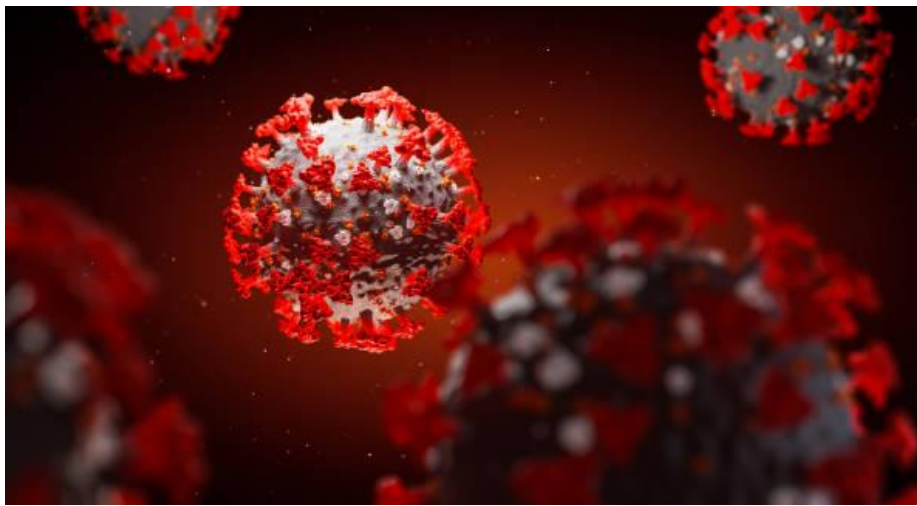
Updated 11:17 AM EDT, Wed October 5, 2022

'It's Life or Death': The Mental Health Crisis Among U.S. Teens

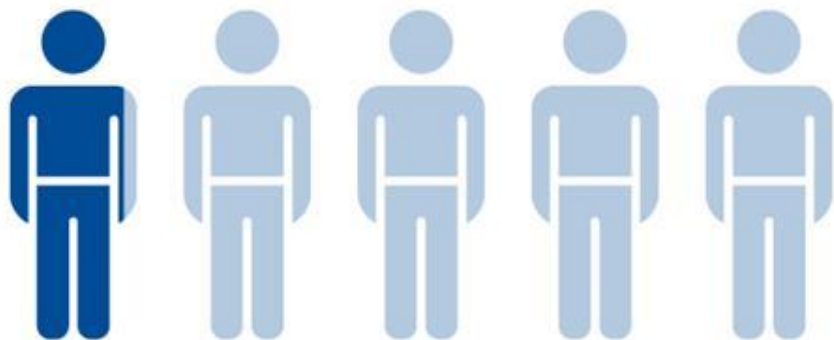
Depression, self-harm and suicide are rising among American adolescents. For one 13-year-old, the despair was almost too much to take.

COVID-19 pandemic triggers 25% increase in prevalence of anxiety and depression worldwide

Wake-up call to all countries to step up mental health services and support



Nearly 1 in 5 Adults (19%) Say Their Mental Health Is Worse Than This Time Last Year



BY GENERATION

34% of Gen Z adults



19% of millennials



21% of Gen X



12% of boomers



8% of older adults





Mental health impacts due to the pandemic

- High rates of anxiety, depression, and post-traumatic symptoms were identified among children (de Miranda et al., 2020).
- Claims data suggest an increase in intentional self-harm, overdoses, and substance use disorders for children aged 13 – 18. For children 6-12, there was an increase in OCD and tic disorders (Fair Health, 2021).

Populations impacted by health equity issues

“Health disparities result in large part from social inequities, systemic oppression, and discriminatory beliefs woven into the fabric of society. Advancing health equity requires sweeping change, catalyzed by key change agents and building into social movements.”

—Travis Lovejoy, PsyD, Chair, Health Equity Committee

UNDESIRED WEIGHT CHANGE AND INCREASE IN STRESS DRINKING*



Have experienced undesired weight changes

58%



Gains of an average of **26 pounds**, with a median of 15 pounds



Losses of an average of **27 pounds**, with a median of 15 pounds

Have been drinking more alcohol during the pandemic to cope with stress

23%

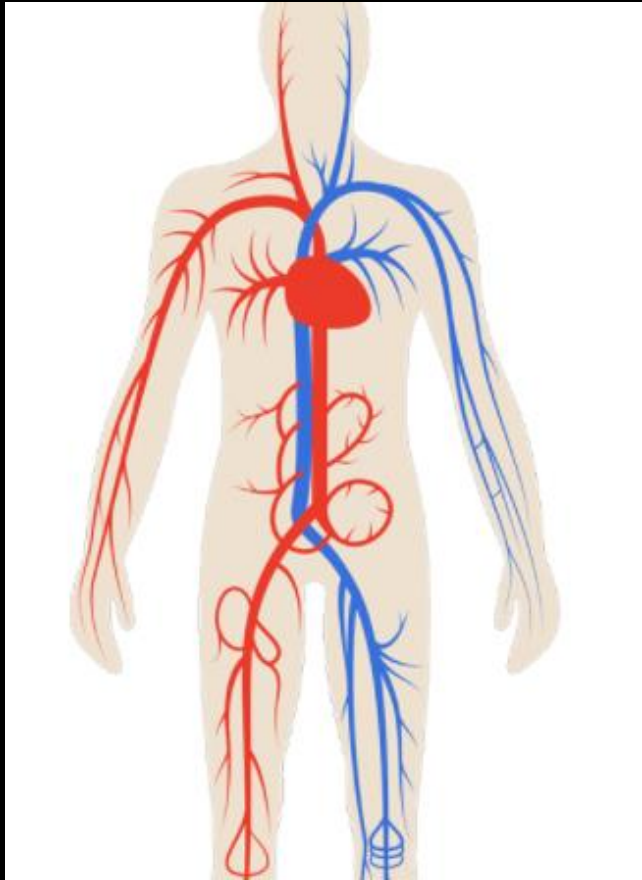


Average of **10 drinks** (median: 6 drinks) per week*

Men averaged **12 drinks** (median: 7 drinks) per week*

Women averaged **8 drinks** (median: 5 drinks) per week*

**Average among adults who reported they have been drinking more alcohol to cope with stress during the pandemic*

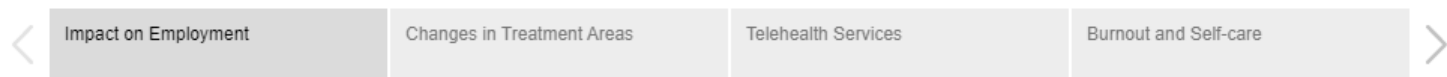


Demand for Mental Health Care Has U.S. Psychologists Overwhelmed: Survey

Nov. 15, 2022, at 9:12 a.m.



APA's COVID-19 Practitioner Survey data



How Psychologists Responded to the Coronavirus Pandemic



62%

of psychologists had more patient referrals

47%

of psychologists had fewer cancellations

39%

of psychologists were working more

Show Instructions

Show Documentation

See Survey Results by Psychologists'

Gender

Female

Male

Select Survey Year

2021

2020

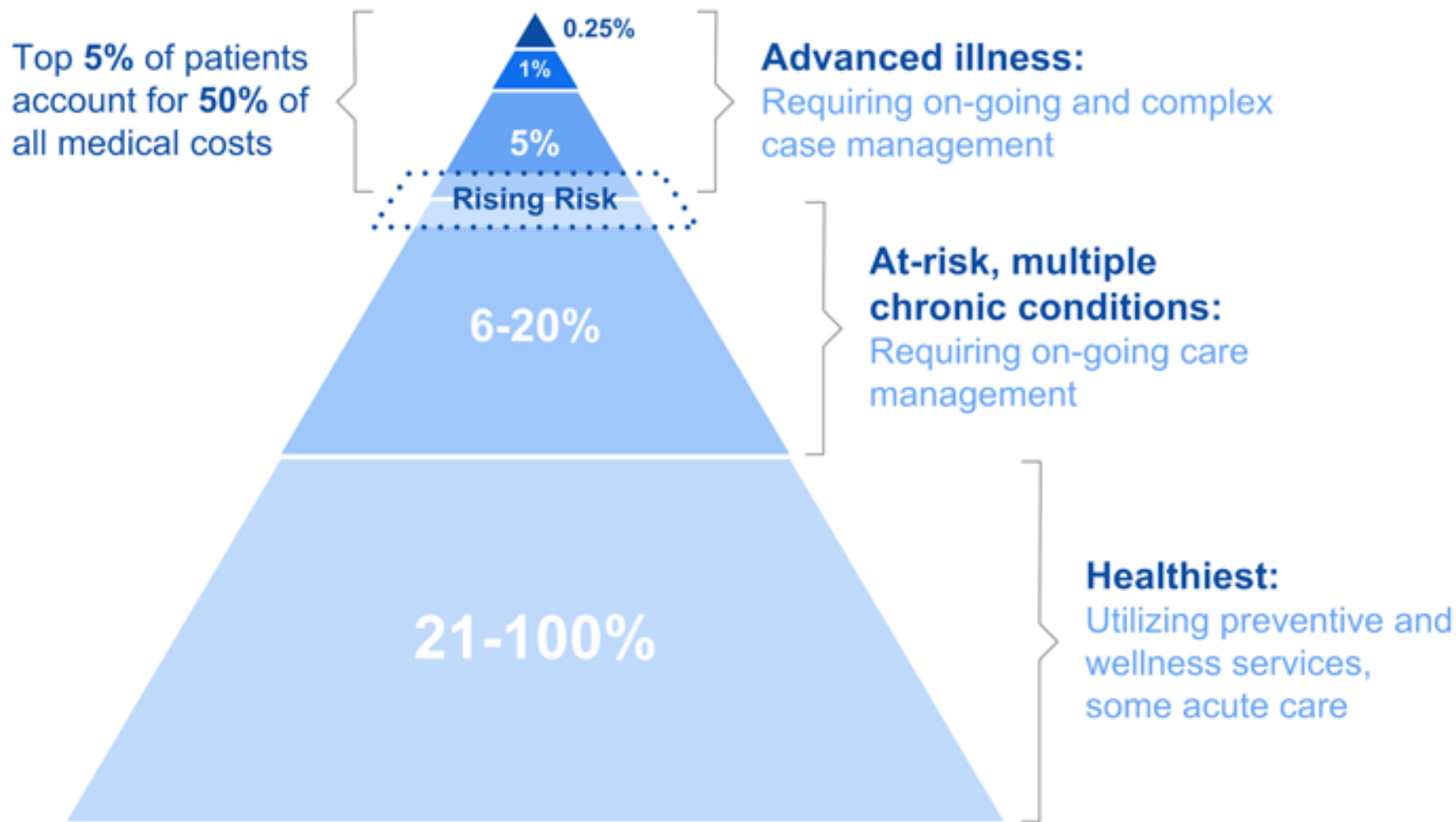


Foundations of Mental Well-Being



What is
POPULATION HEALTH







Role of Activity and Nature

- Physical activity, especially in nature, has shown to improve:
 - Depression
 - Anxiety and Worry
 - Insomnia
 - Stress
 - Burnout
 - Cognitive functioning
 - Memory
 - Physical health – heart disease, cancer, pain, mortality

Questions and Discussion



- For additional information, contact:
- Vaile Wright, PhD
 - Email: cwright@apa.org
 - Twitter:



@drvailewright



PROMOTING PARKS AND OUTDOOR SPACES FOR MENTAL HEALTH

ALLISON COLMAN (SHE/HER)
DIRECTOR OF HEALTH
ACOLMAN@NRPA.ORG



At NRPA...

We seek a future where the full power of parks and recreation is widely recognized for creating a better life for everyone by building strong, healthy and resilient communities.

BECAUSE EVERYONE DESERVES A GREAT PARK.



NRPA's **Three** Pillars

Health and Wellness: Advancing community health and well-being through parks and recreation.

Equity: Striving for a future where **everyone has fair and just access** to quality parks and recreation. Equity is at the center of all we do.

Conservation: Creating a nation of resilient and climate-ready communities through parks and recreation.

A hiker enjoys the trails and views at Dawson Butte Ranch Open Space in Castle Rock, Colorado.

PHOTO COURTESY OF DOUGLAS COUNTY, COLORADO



GUIDING PRINCIPLES

AT THE CORE OF NRPA'S STRATEGIC PLAN



Center Equity and Community

Advancing systems change, community-driven approaches to address barriers to parks and recreation and other drivers of health.



Promote a Holistic Approach

Applying a whole person, whole community lens to ensure people are healthy, safe, engaged, and supported, physically and mentally.



Change the Narrative

Elevating the roll that parks and recreation plays as vital to the conditions where people live, learn, work, play and age.



Support the Professional

Equipping professionals with the skills and competencies needed to develop, lead, and manage high-quality programs, spaces and services.

Parks = A Social Driver of Health



People who live near parks are both physically and mentally healthier than those who do not. Parks and recreation have been proven to positively influence:

- **Physical Activity**
- **Mental Health**
- **Chronic Disease**
- **Healthcare Costs**

*Seven Vital Conditions for Well-Being
Well-Being in the Nation Network

Parks = A Social Driver of Health

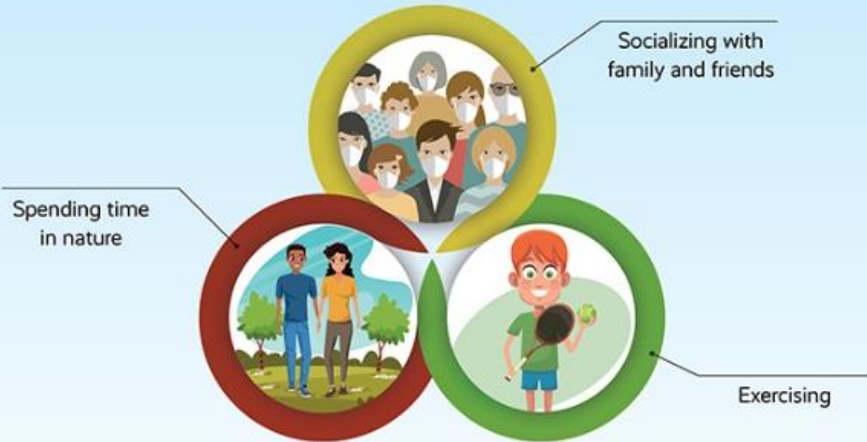


- ✓ **275 million** people visited a local park or recreational facility at least once in 2022
- ✓ Over **40 million** youth are reached through P&R spaces, programs and services each year
- ✓ **95%** agencies manage playgrounds; **81%** have trails, greenways or blueways; **64%** manage recreation centers
- ✓ Nearly **90%** of agencies offer structured sports, fitness, or health education programs for communities

MENTAL HEALTH BENEFITS OF PARKS AND GREENSPACE

Nearly all (93%) U.S. adults say that activities offered by park and recreation professionals and their agencies are beneficial to their mental health.

Top activities include:

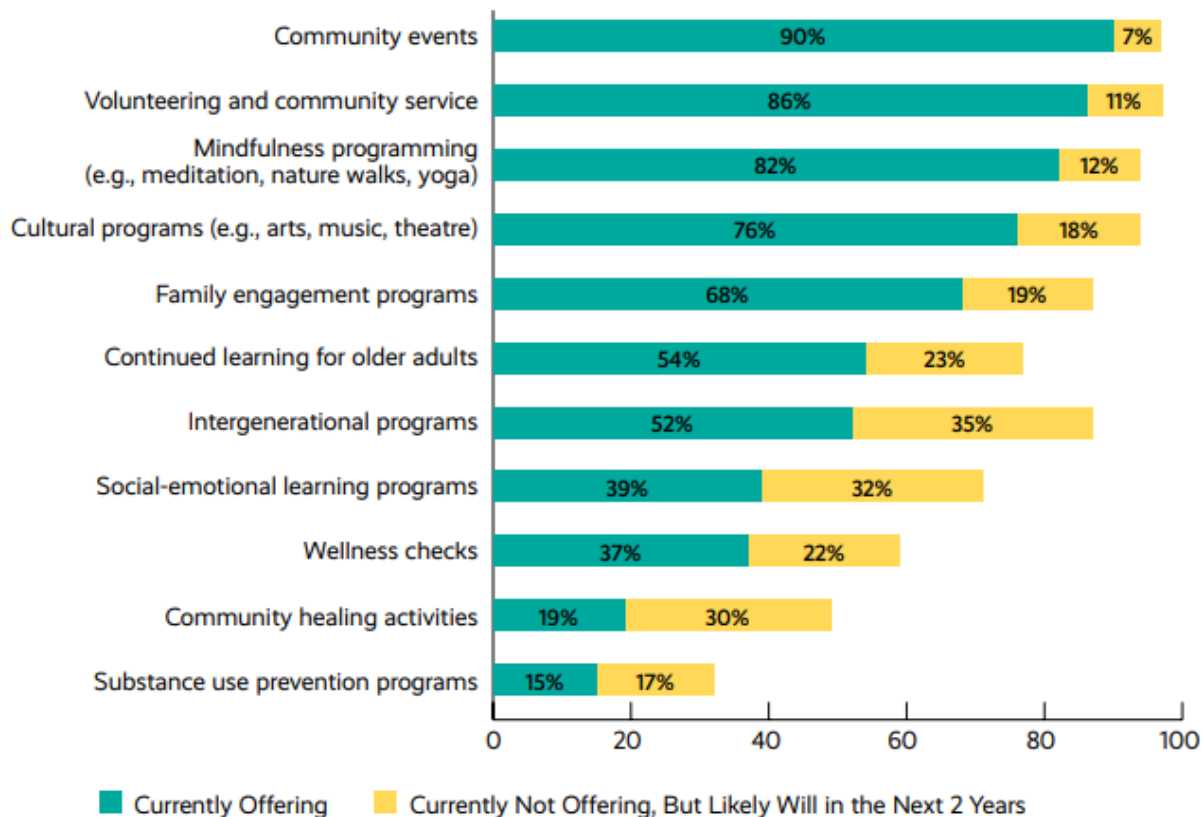


Parents are among those most likely to agree that these activities benefit their mental health, with three in five indicating that **socializing with family and friends** and **spending time in nature** are especially beneficial.

- Access to parks and green space = reduced stress, symptoms of depression and improved mood and attention
- Mental health is related to residential distance from parks and green space
- Physician-diagnosed depression is higher in areas lacking green space compared to neighborhoods with the more
- Greenspace exposure has a positive effect on children including increased concentration, greater attention, higher academic performance, better motor coordination, reduced stress levels, increased social interaction with adults and other children, and improved social skills

PARKS AND RECREATION ADVANCES MENTAL WELL-BEING THROUGH COMMUNITY EVENTS, VOLUNTEER OPPORTUNITIES AND MINDFULNESS PROGRAMMING

(Percent of Agencies Currently Offering or Planning to Offer a Program/Service Within the Next Two Years)



GAPS AND INEQUITIES REMAIN

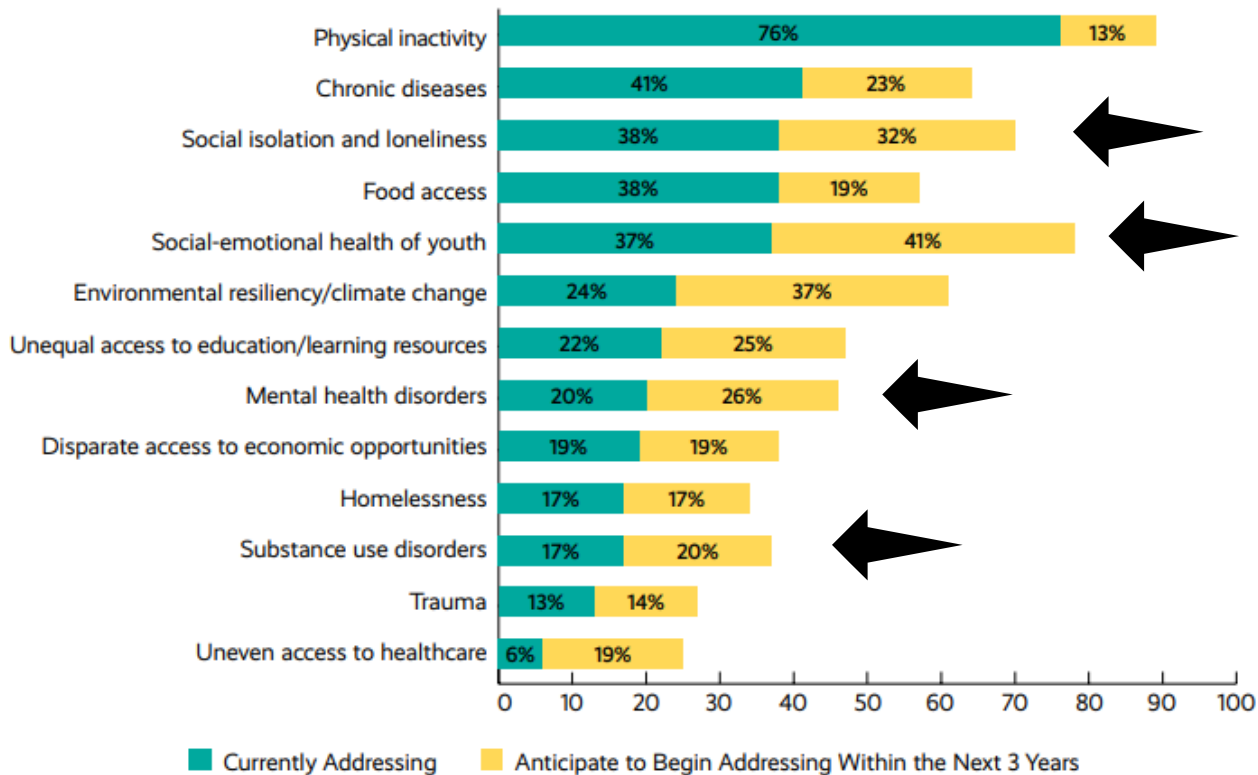
100 million people — 30 percent of the U.S. population — lack access to the benefits parks and recreation provides. Parks are not always safe, inclusive, or community-driven.

Due to a history of systemic racism and injustice, Black, Indigenous, people of color, low-income communities, and other historically disenfranchised populations face additional barriers.



PARK AND RECREATION AGENCIES ADDRESS MANY PUBLIC HEALTH THREATS AFFECTING THEIR COMMUNITIES

(Percent of Agencies Currently Addressing or Anticipate Addressing Within the Next Three Years)



NRPA RESOURCES TO PROMOTE MENTAL HEALTH AND WELL-BEING



MENTAL HEALTH AND SUBSTANCE USE DISORDER RESOURCES:

- LANGUAGE GUIDE
- STIGMA ISSUE BRIEF
- PREVENTION GUIDE
- RESPONDING TO SUBSTANCE MISUSE REPORT



COMMUNITY WELLNESS HUB TOOLKIT:

- SYSTEMS CHANGE APPROACH TO ADVANCING HEALTH EQUITY
- ADDRESSING SEVEN DIMENSIONS OF WELL-BEING

ACTIVE PARKS! IMPLEMENTATION RESOURCE GUIDE:

- INFRASTRUCTURE IMPROVEMENTS + ADDITIONAL ACTIVITIES
- PROCESS GUIDE
- SAMPLE ACTIONS
- RESOURCES AND CASE STUDIES



HEALTH EQUITY FRAMEWORK:

- SELF-ASSESSMENT AND AGENCY ASSESSMENT
- ACTION PLANNING TOOLS
- GOOD, BETTER, BEST CHECKLIST





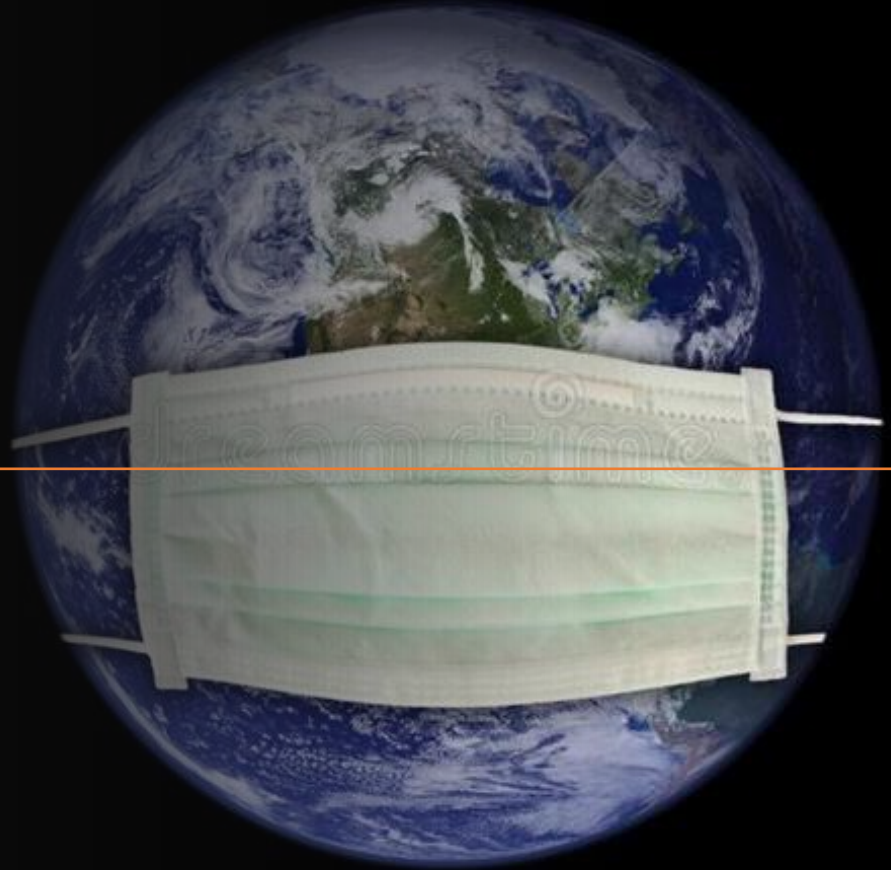
THANK YOU!

ALLISON COLMAN (SHE/HER)
DIRECTOR OF HEALTH
ACOLMAN@NRPA.ORG



EcoRx

In Search of a “Prescription” for Acute Trauma, Chronic Ecological Disenfranchisement, and Related Maladies



Keith G. Tidball, PhD
Cornell University



COVID-19 + MENTAL HEALTH

'A COLLECTIVE TRAUMA'

42%

of Americans reported symptoms of anxiety or depression in December 2020.

4X the rate the previous year

11%

seriously considered suicide in the 30 days before a June 2020 survey.

2X the rate in 2018.

47%

of adults have felt very lonely during the pandemic



Source: Centers for Disease Control and Prevention and American Psychological Association Stress in America Poll, 2021

BY RACE

54%

BLACK

48%

HISPANIC

45%

ASIAN

44%

WHITE

FEEL UNCOMFORTABLE ABOUT LIVING LIFE LIKE THEY USED TO BEFORE THE PANDEMIC.

23%

reported drinking more alcohol to cope with stress.

67%

slept more or less than necessary over the past year.

CHC is here for you.



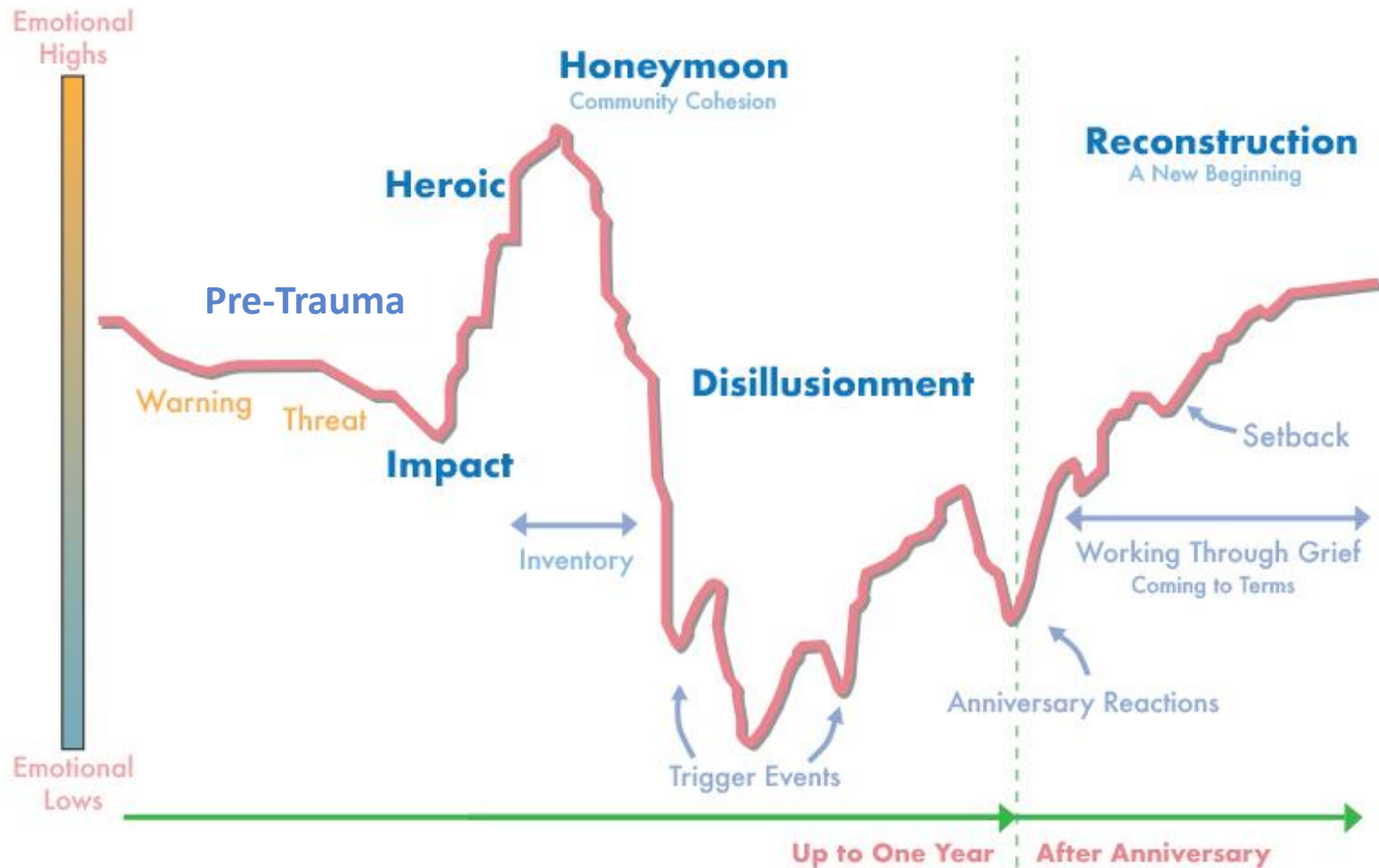
650.688.3625
chconline.org

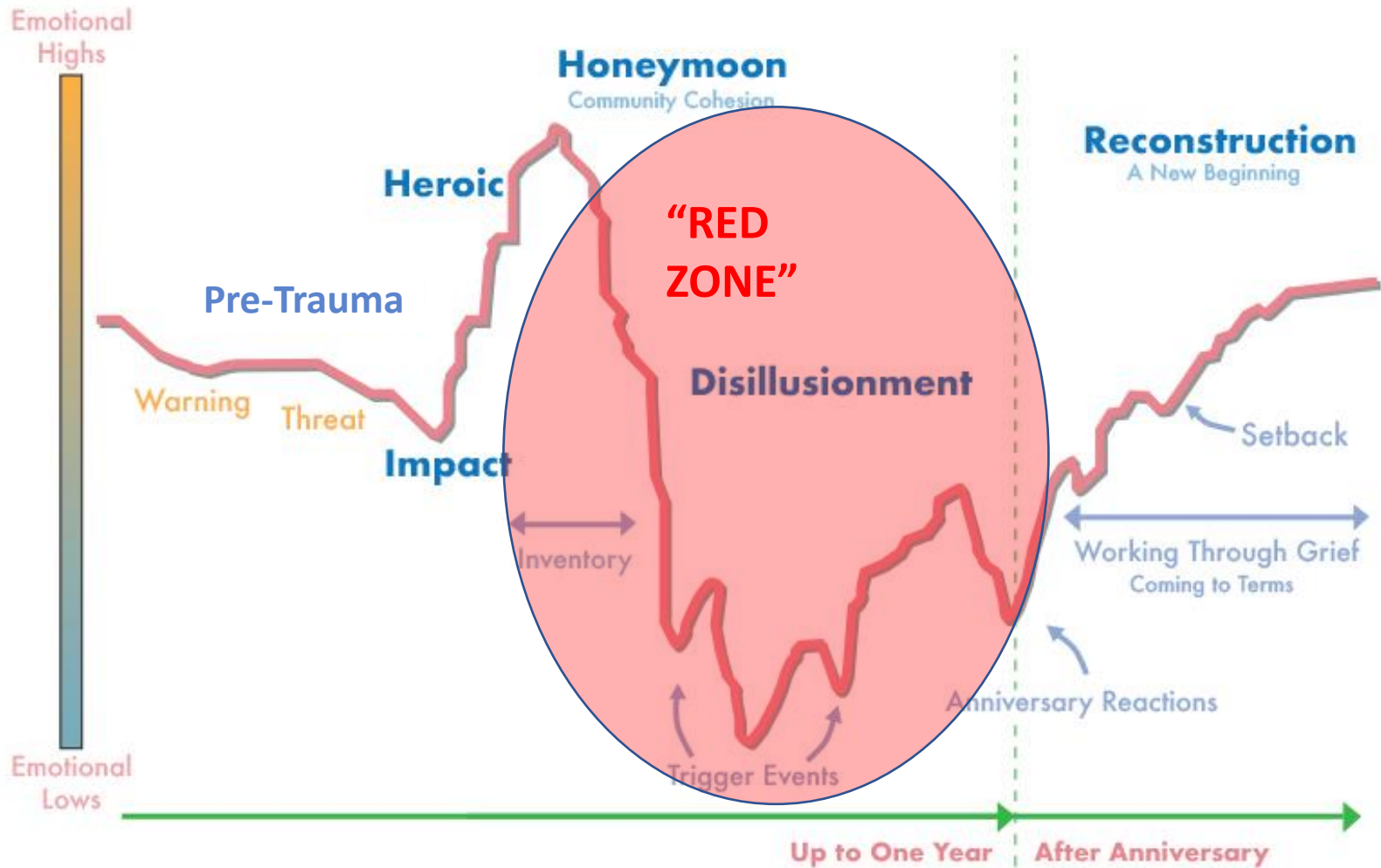


- **Acute trauma:** This results from a single stressful or dangerous event.
- **Chronic trauma:** This results from repeated and prolonged exposure to highly stressful events. Examples include cases of child abuse, bullying, or domestic violence.
- **Complex trauma:** This results from exposure to multiple traumatic events.

Trauma is **ubiquitous**. In the general population, **67% of us have experienced at least one Adverse Childhood Experience**. In people of color, that is more likely to be 83%.

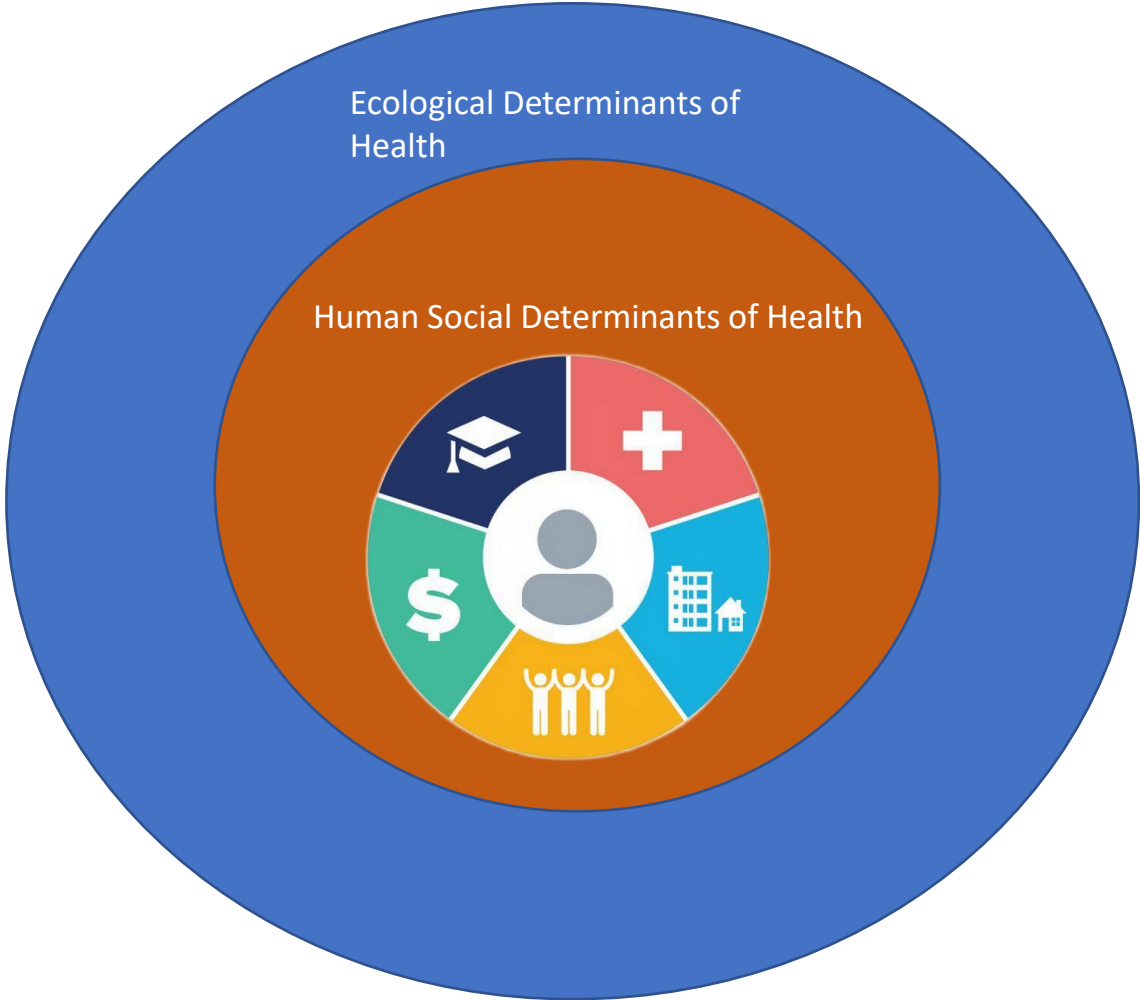






Ecological Determinants of Health

- oxygen
- water
- Food
- ozone layer that protects Earth's surface from high levels of UV radiation
- nitrogen and phosphorus cycles that circulate nutrients needed for plants and thus for all our food
- systems to detoxify wastes through natural processes
- abundant fertile soil, fresh water and marine aquatic systems to grow food and other plants
- materials to construct our shelters and tools
- abundant energy
- reasonably stable global climate with temperatures conducive to human and other life forms



Social Determinants of Health

- Health Care Access and Quality
- Neighborhood and Built Environment
- Social and Community Context
- Economic Stability
- Education Access and Quality



Protective factors are personal or environmental characteristics that help protect people from reactions to trauma to include exhaustion, confusion, sadness, anxiety, agitation, numbness, dissociation, physical arousal, and blunted affect.

Four Pillars of Trauma Recovery



PRACTICING MINDFULNESS

The daily, consistent practice of mindfulness can help [rewire your brain in powerful ways](#). Not only does it help quiet the internal noise, it helps develop an internal locus of control. Mindfulness reduces chronic pain, one of the symptoms of PTSD.



GET MOVING

Physical exercise forces the body to release [endorphins](#), which increase happiness and reduce pain. When you're down or in pain, there might be a temptation to curl up and sleep, but there's no better natural way to raise your emotional state than to get the blood pumping.



WILLINGNESS TO HEAL



Trauma makes it difficult to trust others. It's much easier to isolate oneself and try to go through the healing process alone. Encourage a willingness to connect with others, or join a support group. Encourage pursuit of therapy. Engage in learning to educate yourself along with a group of people who love, value, and encourage you. Healthy relationships can [help one heal more quickly](#).

ACCEPTING SUPPORT FROM OTHERS



Lorem ipsum dolor sit amet, nibh est. A magna maecenas, quam magna nec quis, lorem nunc. Suspendisse viverra sodales mauris, cras pharetra proin egestas arcu erat dolor, at amet.

Emotional
Highs

Emotional
Lows

Honeymoon

Community Cohesion

Heroic

Pre-Trauma

Warning Threat

Impact

**“RED
ZONE”**

Disillusionment

Reconstruction

A New Beginning

Inventory

Setback

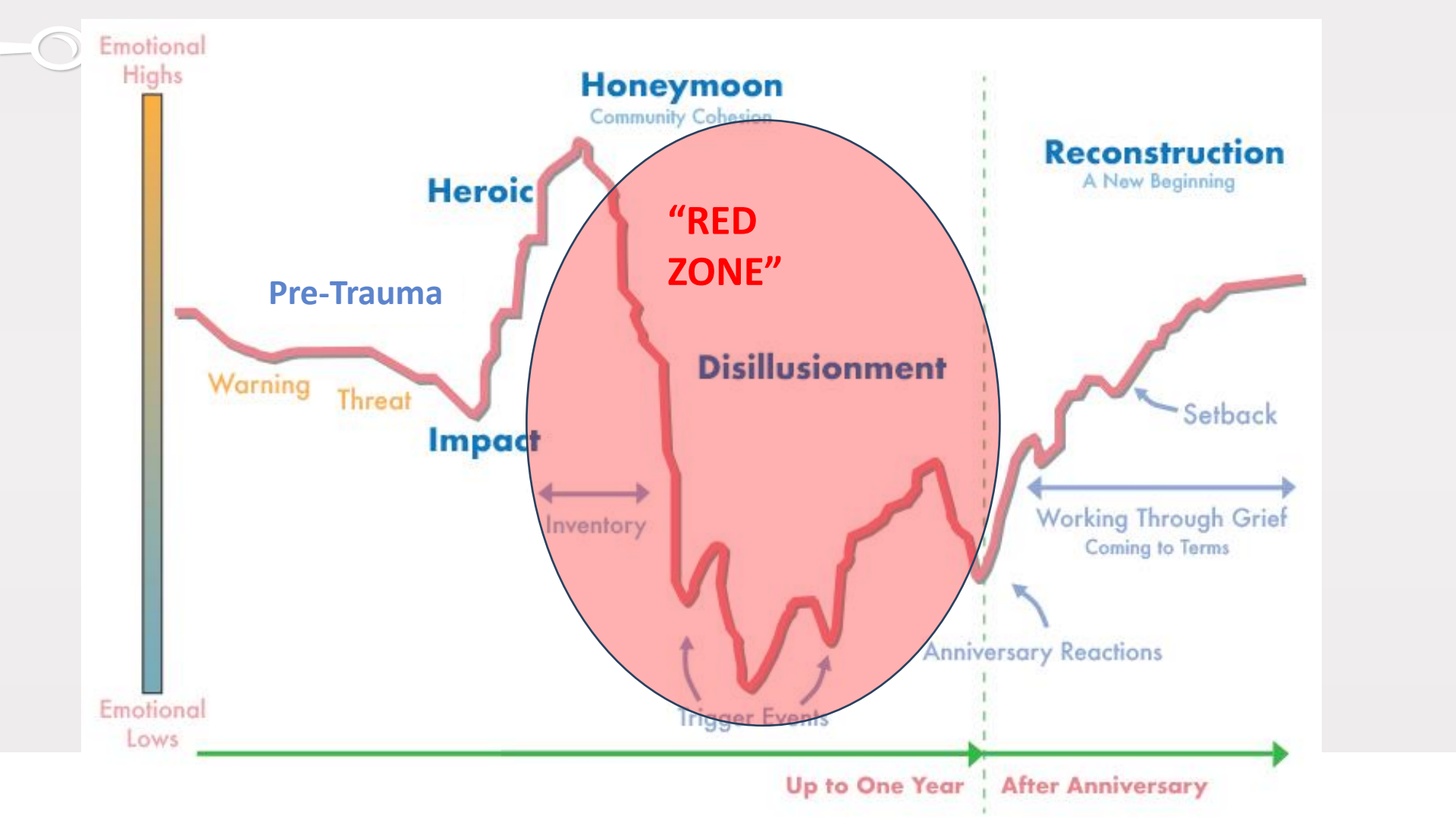
Working Through Grief
Coming to Terms

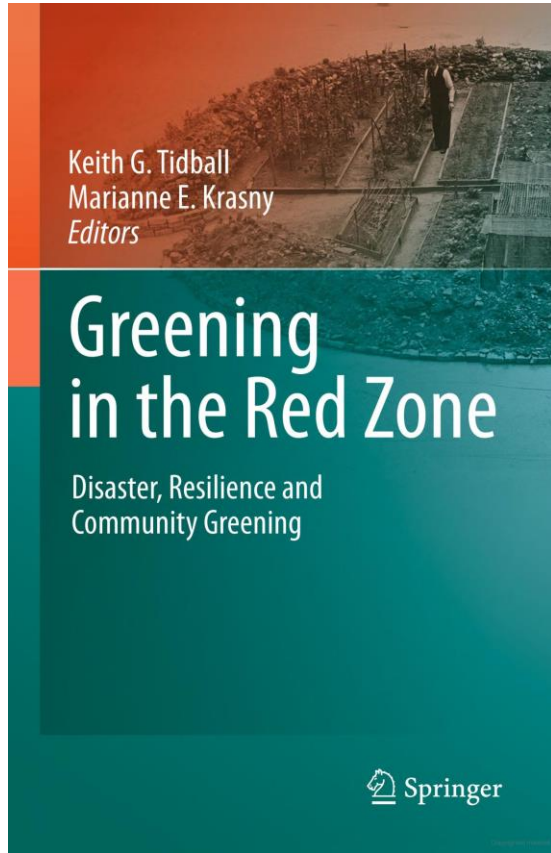
Anniversary Reactions

Trigger Events

Up to One Year

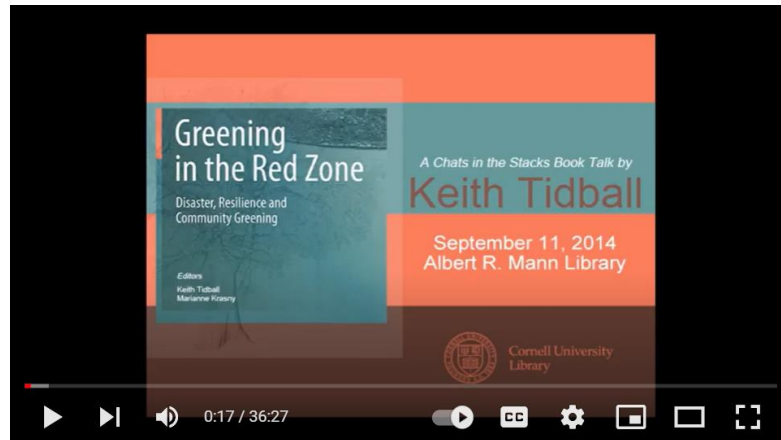
After Anniversary





<https://link.springer.com/book/10.1007/978-90-481-9947-1>

Creation and access to green spaces promotes individual human health, especially in therapeutic contexts among those suffering traumatic events. But what of the role of access to green space and the act of creating and caring for such places in promoting social health and well-being? Greening in the Red Zone asserts that creation and access to green spaces confers resilience and recovery in systems disrupted by violent conflict or disaster. This edited volume provides evidence for this assertion through cases and examples. The contributors to this volume use a variety of research and policy frameworks to explore how creation and access to green spaces in extreme situations might contribute to resistance, recovery, and resilience of social-ecological systems.



<https://www.youtube.com/watch?v=eDCYJKZuoyY>

SOCIAL SCIENCES

Linking the nonmaterial dimensions of human-nature relations and human well-being through cultural ecosystem services

Lam Thi Mai Huynh^{1*}, Alexandros Gasparatos^{2,3*}, Jie Su¹, Rodolfo Dam Lam⁴, Ezekiel I. Grant¹, Kensuke Fukushi^{1,3}

Nature contributes substantially to human well-being through its diverse material and nonmaterial contributions. However, despite the growing literature on the nonmaterial dimensions of human-nature relations, we lack a systematic understanding of how they are linked with human well-being. Here, we use the concept of cultural ecosystem services (CESs) as a lens to explore this interface. Through a systematic review of the peer-reviewed literature, we elicit the unique pathways and mechanisms linking individual CESs and constituents of human well-being, as well as their relative effects. Subsequently, we identify their complex interactions through latent class analysis and multiple correspondence analysis, which delineate five major assemblages that reflect synergies and trade-offs at the interface of CESs and human well-being. We critically discuss key research trends and gaps and propose directions for future research and practice to leverage the potential of the nonmaterial contributions of nature for human well-being and sustainability more broadly.

INTRODUCTION

Nature contributes manifold benefits to humans, at the individual, group, and societal levels. Beyond material and tangible contributions such as food, raw materials, clean water, and hazard regulation, among others, nature also provides a large diversity of nonmaterial contributions through opportunities for recreation and leisure, spiritual fulfillment, personal development, social relations, and aesthetic experiences (1, 2). These nonmaterial contributions can have substantial effects on the well-being of humans at different scales (3), manifesting in very different manners (4, 5).

The academic community has repeatedly emphasized the necessity to understand the complex nonmaterial dimensions of human-nature relationships and unravel how they intersect with human well-being (1, 6, 7). Understanding the underlying processes behind how the nonmaterial contributions of nature are linked to human well-being, designing appropriate interventions to leverage their contribution to human well-being, and mitigating the negative impacts of human activities on them are all essential for sustainable ecosystem management (6, 8).

Up to now, a large body of literature has attempted to unravel in a coherent manner the nonmaterial dimensions of human-nature relations, using very diverse lenses and methodologies. For example, studies have come from fields as diverse as connectedness with nature, cultural ecosystem services (CESs), environmental psychology, environmental education, environmental sociology, geography, outdoor recreation studies, and even political ecology (9, 10). However, despite this ever-expanding body of literature, the current evidence regarding the nonmaterial dimensions of human-nature

relations is highly fragmented, particularly in terms of their actual linkages to human well-being and how they manifest. This is due to a series of reasons. First, the relevant literature tends to adopt different theoretical frameworks and terminologies (3, 11–13), resulting in fragmented knowledge and inconsistent assessments. This is true both for the nonmaterial contributions side and for the human well-being side and is reinforced by the limited effort to synthesize cohesively this knowledge from these diverse academic fields (4). Second, both the provision of nonmaterial contributions and the linkages to human well-being are highly context dependent, which complicates their generalization and systematic understanding across different localities and scales (4, 10).

The concept of ecosystem services, broadly defined as the benefits that humans derive directly and indirectly from nature (1), has emerged in the past two decades as one of the focal lenses for exploring human-nature relationships (14). Despite certain criticisms (15) and the transdisciplinary evolution of the term as nature's contributions to people (NCPs) (16, 17), the concept of ecosystem services has provided one of the most popular lenses for exploring human-nature relations when considering its huge proliferation in the academic literature (18).

In this respect, the concept of CESs has been a major lens for exploring the nonmaterial dimensions of human-nature relations (10). CESs encapsulate, among others, recreation, spiritual enrichment, cognitive development, social relations, and aesthetic values (1, 3, 13). Although CESs have been used extensively in the literature (12), it has been exceptionally challenging to systematize concretely and comprehensively their linkages with human well-being (11, 12). This is in no small part due to the fact that, as “representations” of nonmaterial human-nature relations, CESs are often intangible, subjective, socially constructed, and dependent on human perception, thus requiring very different sets of tools, metrics, and approaches for their understanding and assessment (3, 19, 20).

Here, we argue that by using CESs as a lens, it is possible to generate valuable insights of the actual interface between the nonmaterial dimensions of human-nature relations and human well-being. This

Copyright © 2022
The Authors, some
rights reserved;
exclusive licensee
American Association
for the Advancement
of Science. No claim to
original U.S. Government
Works. Distributed
under a Creative
Commons Attribution
NonCommercial
License 4.0 (CC BY-NC).

After reviewing hundreds of scientific papers on “cultural ecosystem services,” or the nonmaterial benefits of nature, researchers have identified 227 unique pathways through which people’s interactions with nature can positively or negatively affect well-being.

The paper:

<https://www.science.org/doi/epdf/10.1126/sciadv.abn8042>

A Review:

<https://www.washingtonpost.com/climate-solutions/2022/08/05/nature-study-impact-hiking-outdoors/>

¹Graduate Program in Sustainability Science, Global Leadership Initiative (GPLI), The University of Tokyo, 5-1-5 Kashiwanoha, Kashiwa City 277-8563, Japan. ²Institute for Future Initiatives (IFI), The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8654, Japan. ³Institute for the Advanced Study of Sustainability (IASUS), United Nations University, 5-53-1 Jinguasai, Shibuya-ku, Tokyo 150-8925, Japan. ⁴WorldFish, Penang, Malaysia.
*Corresponding author. Email: lam.huynh@es.k.u-tokyo.ac.jp (L.T.M.H.); gasparatos@es.k.u-tokyo.ac.jp (A.G.)

Table 1. Mechanisms linking CEs and human well-being. The 6 mechanisms indicated with an asterisk (*) are adapted from a previous study (5), while the other 10 mechanisms are defined by the authors. For each of the mechanisms, we provide as an example a unique pathway of CE mechanism—constituent of human well-being. Note that some mechanisms mediate more connections of individual CEs and human well-being constituents. A comprehensive explanation of the different pathways for each mechanism can be found in tables S12 to S14. The table presents in alphabetical order the positive (nos. 1 to 13) and negative (nos. 14 to 16) mechanisms.

No.	Type of mechanism	Definition				Example
			Sample CES	Channel of interaction	Sample constituent of human well-being	Description
1	Cognitive*	The development of knowledge and understanding via interaction with nature	Education	Intellectual practice	Learning and capability	Ecosystems are a source of learning and knowledge about the environment, history, culture, and human relationship. Ecosystems provide opportunities for scientific research, environmental education, and learning from older generations. The education of children within/through the natural environment can assist in the development of knowledge, skillsets, and a sense of wonder for the world (24, 41).
2	Cohesive	The development of meaningful relationships between people via interaction with nature	Social relation	Cultural practice	Connectedness and belonging	People can develop bonds with family members, friends, and other individuals through the interaction with nature. Social interactions and activities in natural settings such as camping trips and social events in natural settings can strengthen ties, reinforce fundamental values, and inspire respect, responsibility, solidarity, and caring for others, broader communities, and the environment (69).
3	Communicative*	The development of social communication and conversation via interaction with nature	Knowledge system	Intellectual practice	Learning and capability	In some cultural contexts, the knowledge of the culture and the practices needed for survival are part of the people's capacity for self-determination and personal development. These are often transmitted via communication between elderly people and young people at cultural events in natural settings, which are essential in this process. For example, indigenous communities transmit via communication in natural settings knowledge systems that are important for their personal development and livelihoods (119).
4	Creative*	The experience of new and original situations that inspire artistic work, aesthetic appreciation, creativity, and freedom (among others) via interaction with nature	Inspiration value	Cultural practice	Inspiration and fulfillment of imagination	Nature has inspired people throughout the history of humanity for artistic expression. These examples can be inspiration to paint, draw, take photos, be active/get out, conserve, manage, protect, discover, explore, and generally think about things (5).
5	Evolutionary	The gradual change of individuals' personality, mood, feelings, attitude, perception, behavior, values, and belief systems over time (more often internal change) via interaction with nature	Recreation and tourism	Cultural practice	Learning and capability	On many occasions, the natural environment tends to make people more friendly, playful, relaxed, and affectionate over time (24). In some cases, nature-based recreation activities are gratifying and gradually increase courage or self-esteem (41).
6	Formative	The change of individuals' moods, feelings, attitudes, perception, behaviors, and values that is relatively instant or over short periods of time (more often internal change) via interaction with nature	Aesthetic value	Form	Identity and autonomy	Ecosystems offer spaces for individuals to instantly express their personal distinctiveness and identity without feeling constrained by external factors such as the norms and values imposed by society. In some cases, being in nature immediately enables achieving a personal sense of freedom and escapism from the social boundaries created by extrinsic factors of society. The sense of freedom and autonomy inspired by wild nature in that moment can allow individuals to strengthen their own intrinsic values and beliefs and to feel they can be free and make their own choices in lives (120).

continued on next page

No.	Type of mechanism	Definition	Example			Description
			Sample CES	Channel of interaction	Sample constituent of human well-being	
7	Intuitive*	The sensual experiences, human instincts, and feelings (often of a spiritual and religious nature) via interaction with nature	Spiritual value	Spiritual practice	Spirituality	Many people experience something deeply spiritual when they interact with nature. In some geographical contexts, people find meanings in nature from the time they are born to the time they die, while the sense of spirituality attached to nature can bring hope, faith, personal beliefs/values, and empowerment (49).
8	Regenerative*	The generation of restorative outcomes (e.g., a alleviation of fatigue and emotional stress) through recreation, leisure, tourism, escapism, and therapy via interaction with nature	Recreation and tourism	Cultural practice	Mental health Physical health Subjective well-being	Interaction with nature can improve mental health by helping to (i) reduce stress, anxiety, and depression; (ii) reduce visits to psychologists; (iii) improve sleeping quality; (iv) reduce the use of antidepressants, sleeping medicine, and sedatives; (v) increase vitality; (vi) decrease cognitive decline; (vii) increase ability of recovery and healing from crisis; and (viii) reduce mental fatigue and illness (4, 34). Benefits to physical health through interaction with nature include (i) lower body mass index; (ii) reduced prevalence of disease; (iii) reduced obesity; (iv) lower somatization level; (v) decreased cognitive decline; (vi) reduced blood pressure, heart rate, and muscle tensions; (vii) improved immune system; (viii) increased restoration and healing; and (viii) lower mortality risk (4).
9	Remunerative	The economic benefits people obtain from ecosystems through nonmaterial benefits in cash or other monetary forms	Recreation and tourism	Cultural practice	Economic well-being	Nature-based tourism can directly or indirectly contribute to the livelihoods of local communities and broader economic growth. Examples include the direct generation of revenue from accommodation, transportation, guided tours, and food and beverage sales. Broader indirect contributions include poverty alleviation and employment generation (121, 122).
10	Retrospective*	The personal memories and reflections of the past via prior interaction with nature	Sense of place	Form	Identity and autonomy	Natural landscapes are important to some people as they have evolved emotional and cognitive bonds, becoming parts of their personal and collective memory and their life stories (123).
11	Satisfactive	The feeling of satisfaction and fulfillment of expectations and needs associated with interaction with nature	Cultural heritage value	Cultural practice	Subjective well-being	Engaging in ecosystem-related livelihood activities can instill pride and sense of satisfaction. In many cases, farmers through their livelihood engagement with nature feel fulfilled, have pride for their lives and a sense of purpose in life when putting a good day at work (120).
12	Transactive	The social benefits people obtain by bartering or trading the products of ecosystems	Cultural heritage value	Cultural practice	Economic well-being Connectedness and belonging	For many indigenous communities, particular species carry a special cultural heritage value that can be used for exchange and trades among kins to sustain the reciprocal relationships essential to their functioning (124).
13	Transcendentive	The benefits that lie beyond the ordinary experiences and the regular physical realm, more often associated with religious or spiritual values via interaction with nature	Spiritual value	Spiritual practice	Spirituality	Many people and communities experience ecosystem-inspired feelings related to "entities larger than themselves" (125). For some people, being in natural settings makes them appreciate people's connection to all things in the universe (24).
14	Apprehensive	The anxious and fearful feeling generated via interaction with nature	Aesthetic	Form	Certainty, sense of control, and security	Some people are afraid of their safety when encountering certain natural features via visual or auditory interactions, such as scary animals, dangerous predators, animal blood, and areas that are dark with high tree cover, among others (4, 22, 46).
15	Destructive	The direct damages caused to health, relationships, finance, and capability (among other constituents of human well-being) via the loss/degradation of CESs	Aesthetic	Form	Economic well-being	Some ecosystem disservices associated with CESs can increase the direct cost for repairs and maintenance, control, or remove unwanted species. For example, damage to physical structures can be caused by accelerating corrosion due to bird excrements or the destruction of pavements due to tree roots or animals digging nesting holes (50).
16	Irritative	The unpleasant and annoying feelings people obtain via their interaction with nature	Aesthetic	Form	Mental health	Some ecosystem disservices associated with CESs cause negative feelings such as annoyance and discomfort, e.g., annoyance or disgust wildlife noise, animal excrements, or plant litter (46, 50).

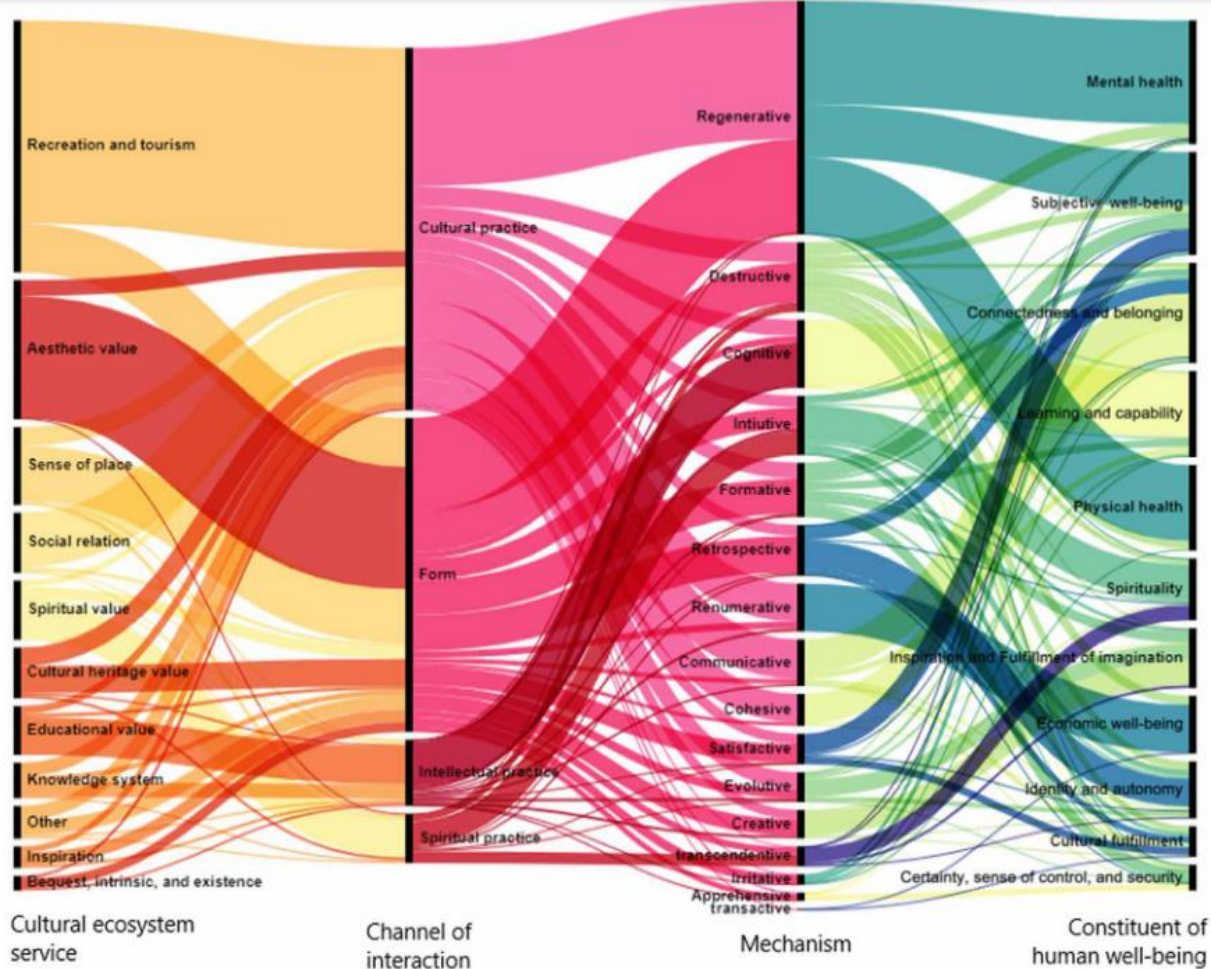
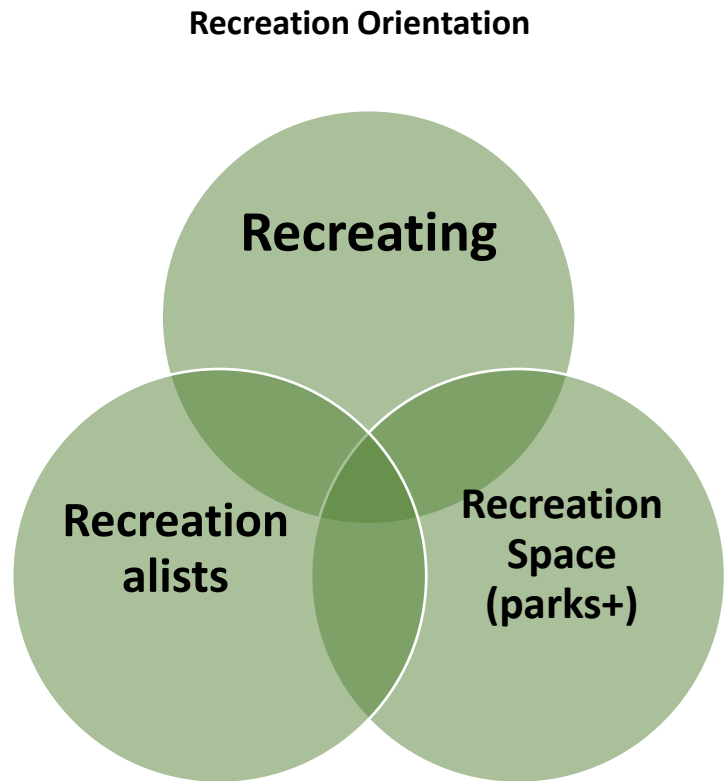
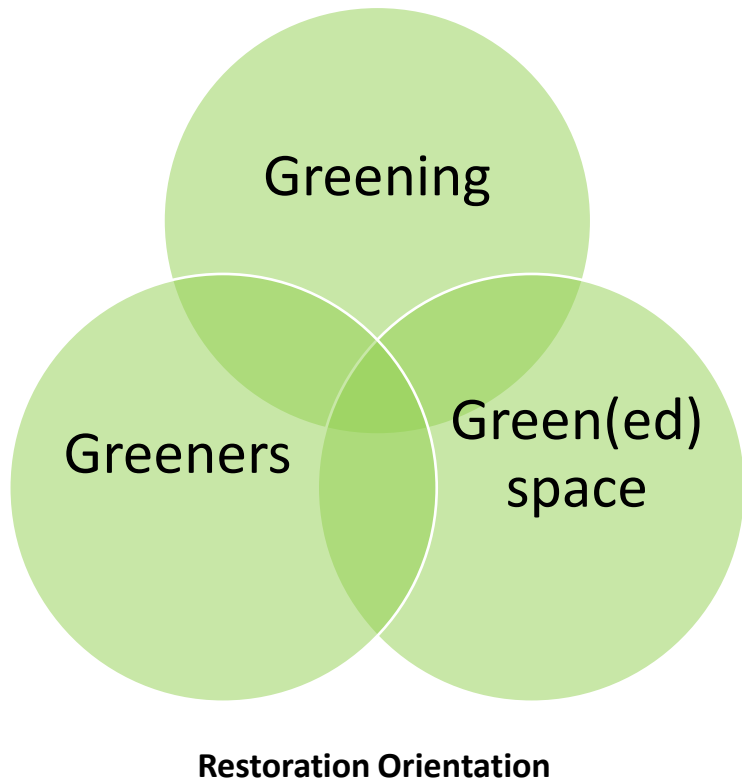
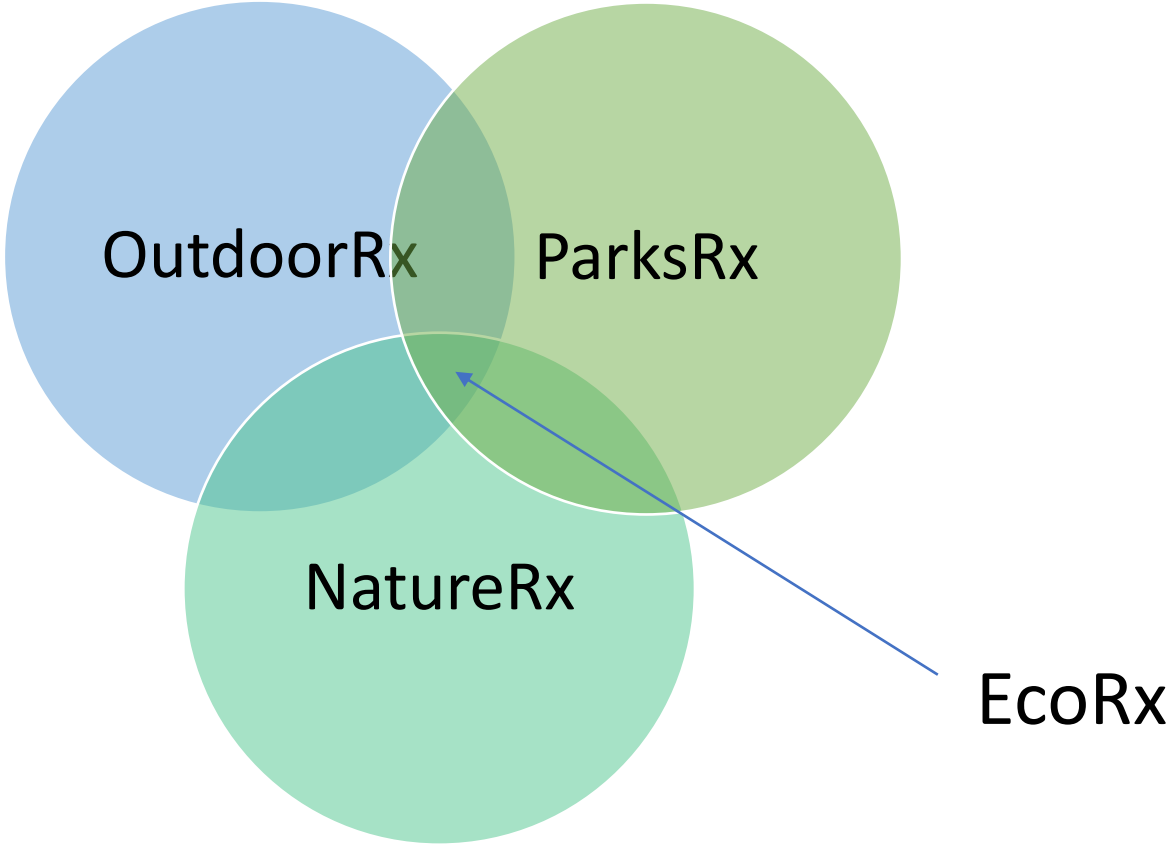


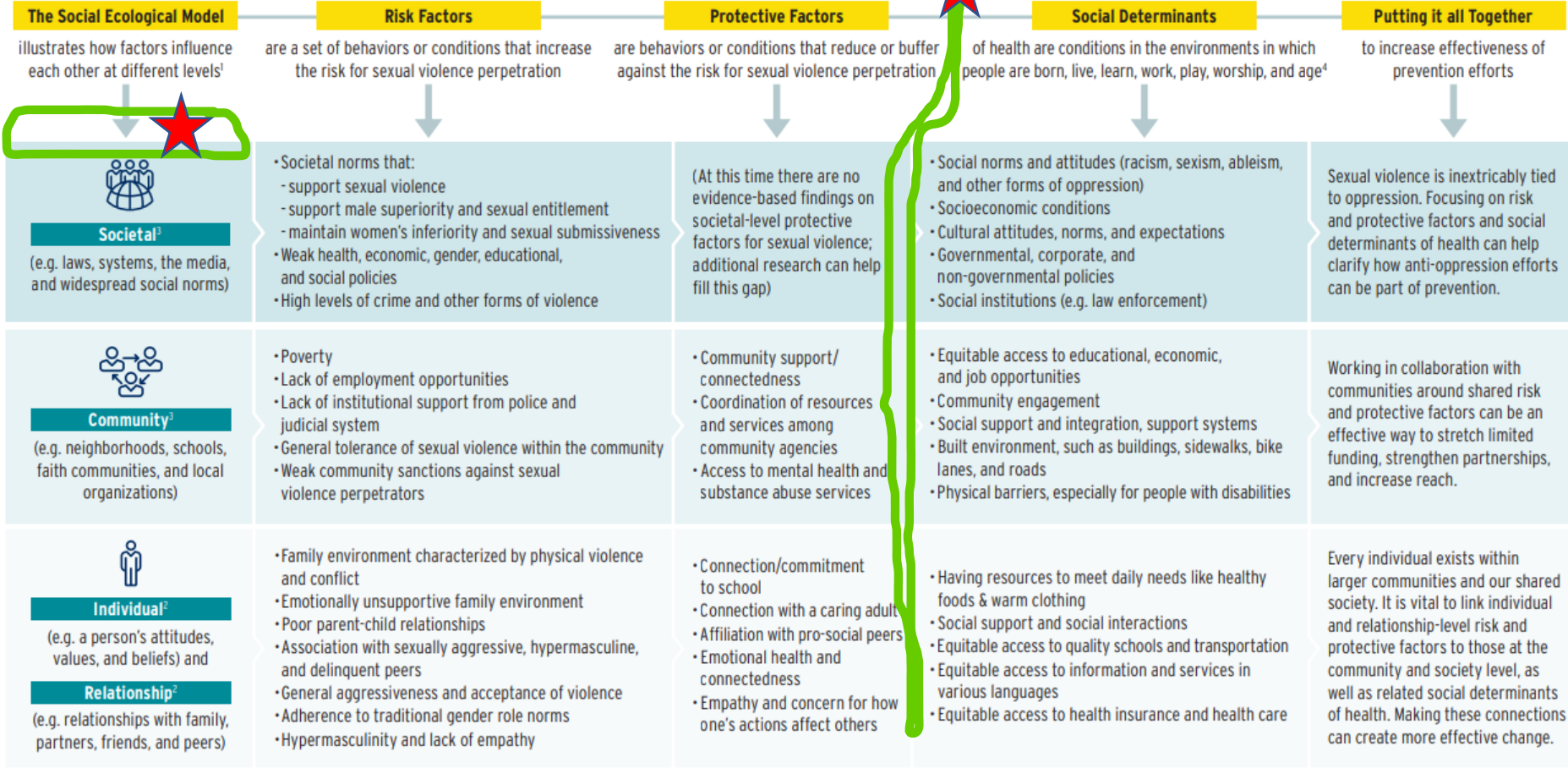
Fig. 2. Frequency of the CESs, mechanisms, and constituents of human well-being documented in the reviewed studies. The width of each line linking any two elements in the alluvial diagram represents the number of relevant observations (of the unique 1134 total observations). This essentially represents the popularity/visibility of each element in the reviewed literature and should not be perceived as a metric of importance or weight linking any two components.





RISK & PROTECTIVE FACTORS

This chart maps out risk and protective factors and social determinants of health along various points in the social ecological model. Understanding these factors and determinants at the societal, community, and individual/relationship levels can increase the effectiveness of sexual violence prevention efforts.

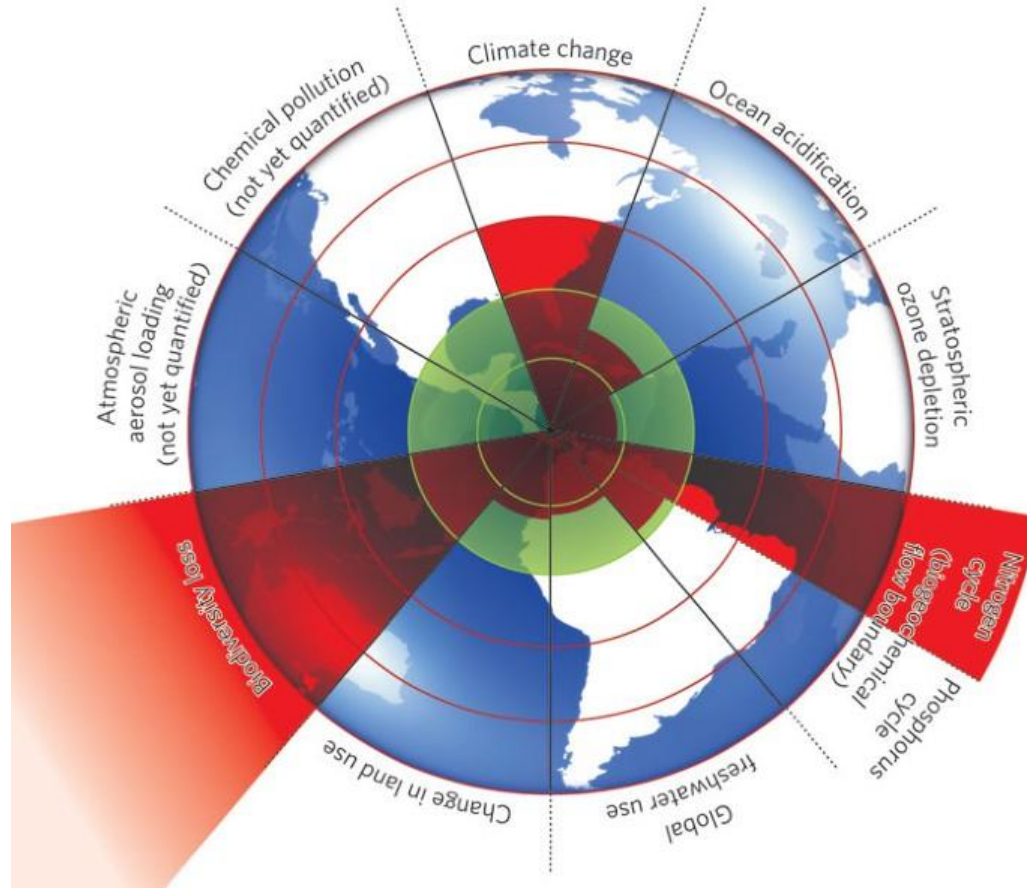


Thank You!

Keith G. Tidball, PhD
kgtidball@cornell.edu



Threats



Rockström, J., Steffen, W., Noone, K. *et al.* A safe operating space for humanity. *Nature* **461**, 472–475 (2009).

<https://doi.org/10.1038/461472a>

Panel Discussion



Additional Questions

The background of the slide is a scenic landscape featuring rolling green hills and a winding road. The hills are covered in lush green grass, and the road curves through the valleys. In the distance, there are more hills and a small town or village. The sky is a soft, hazy blue, suggesting a clear day. The overall atmosphere is peaceful and natural.



Thank you!