

Planetary Health, climate change, and human health & well-being

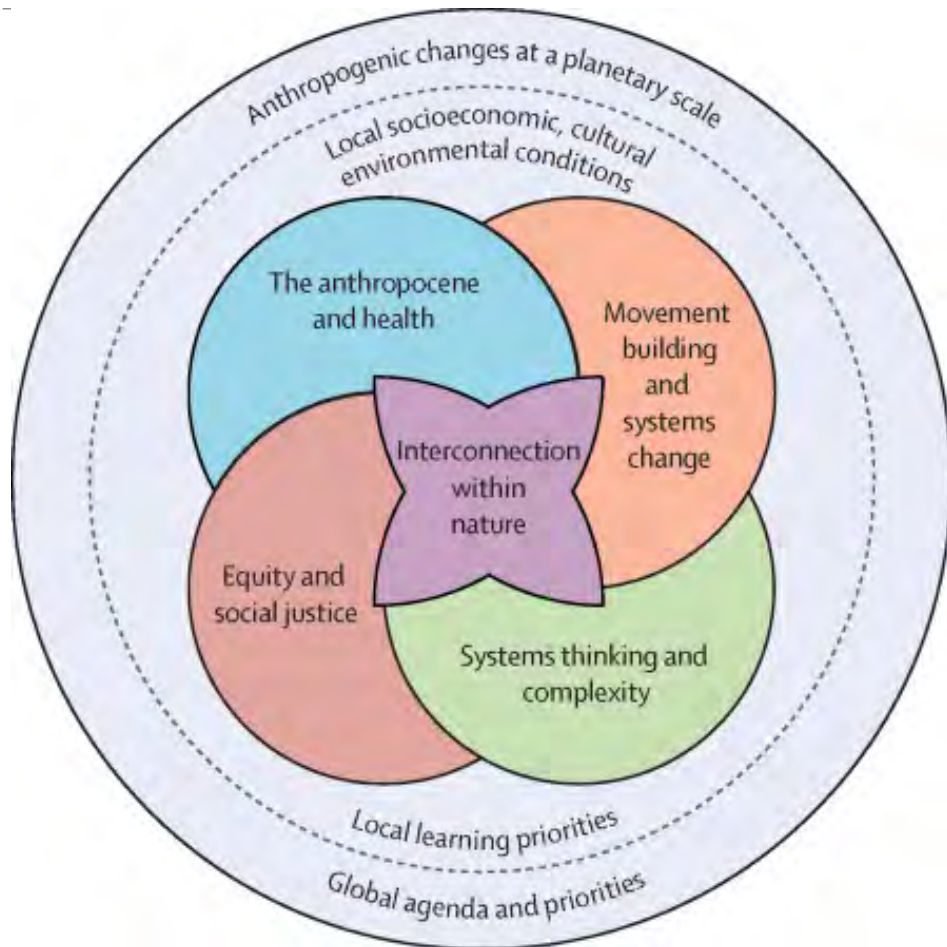
HEALTH & WELLNESS TRACK – SEMRA AYTUR, PHD, MPH
& LAUREN FERGUSON, PHD



Presentation overview

- Our presenters
- Linking Planetary, Forest, and Human Health
 - Sense of place activity
- Case studies
 - UNH College Woods
 - Lye Brook Wilderness
 - New Hampshire recreation
- Final thoughts and questions

Planetary Health



Defining Terms: Planetary Health

Planetary health is a solutions-oriented, transdisciplinary social movement focused on analyzing and addressing the impacts of human disruptions to the Earth's natural systems and ways to optimize health through reciprocity.

Defined as “the health of human civilization and the state of the natural systems on which it depends ”

Focuses on the *interdependence* of people and the environment.

- Emphasizes balancing human needs with the preservation of the Earth's ecosystem services to sustain the health and well-being of future generations.
- Requires a multidisciplinary, cross-sector, and transborder approach to change mindsets and behaviors at every level, from global to local.



Unites many similar concepts that address the intersections between health and the environment:

Environmental Justice
EcoHealth
One Health
GEOHealth (Global
Environmental and
Occupational Health)

Pathways by which climate change affects health (Direct and Indirect Impacts)

Sources:
IPCC, 2007

Wake, C., Bucci, J.P. & Aytur, S.A. (2014, October). *Climate Change and Human Health in New Hampshire: An Impact Assessment*. Report to New Hampshire Department of Health and Human Services. <https://scholars.unh.edu/cgi/viewcontent.cgi?article=1007&context=sustainability>

The Intergovernmental Panel on Climate Change (IPCC) 6th Assessment Report concludes that significant impacts on public health have already occurred and are likely to increase as global temperature continues to rise, accelerating **syndemic stress**.

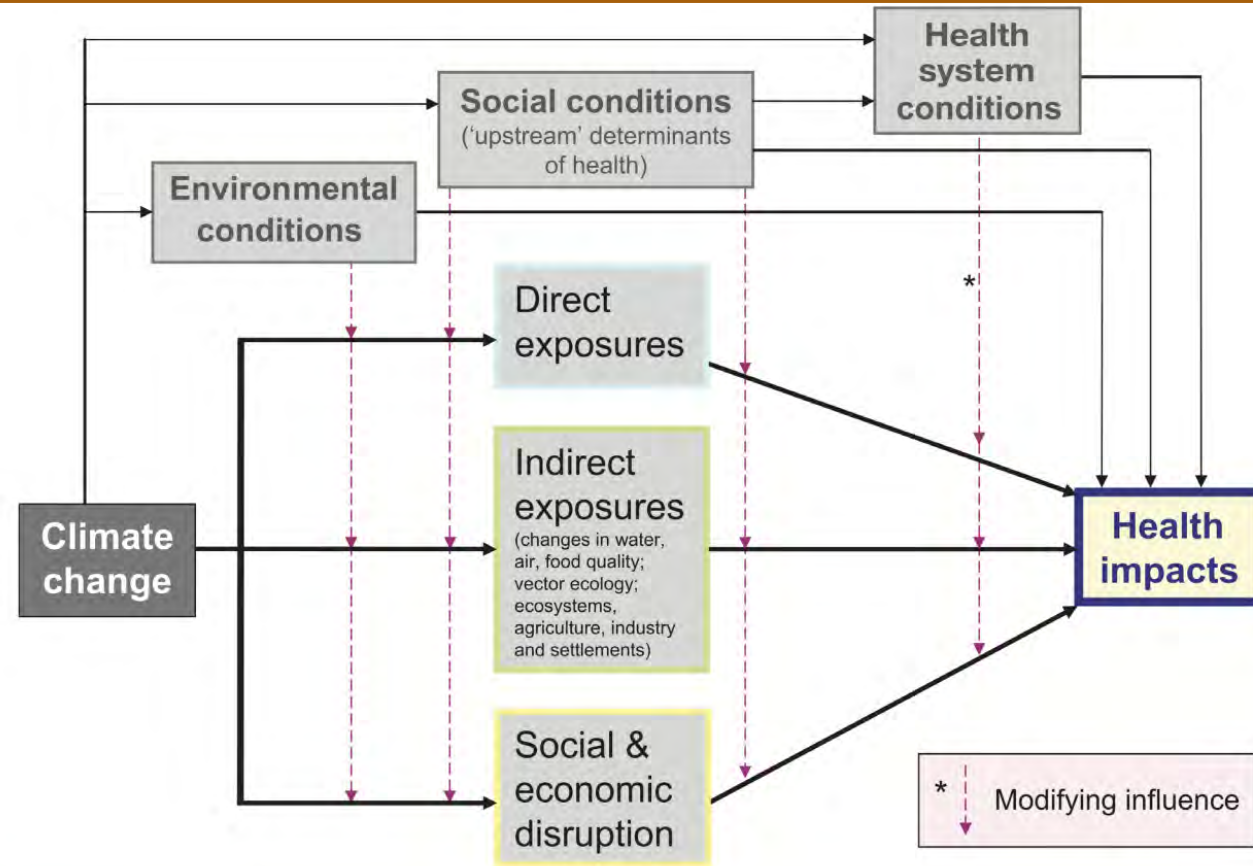
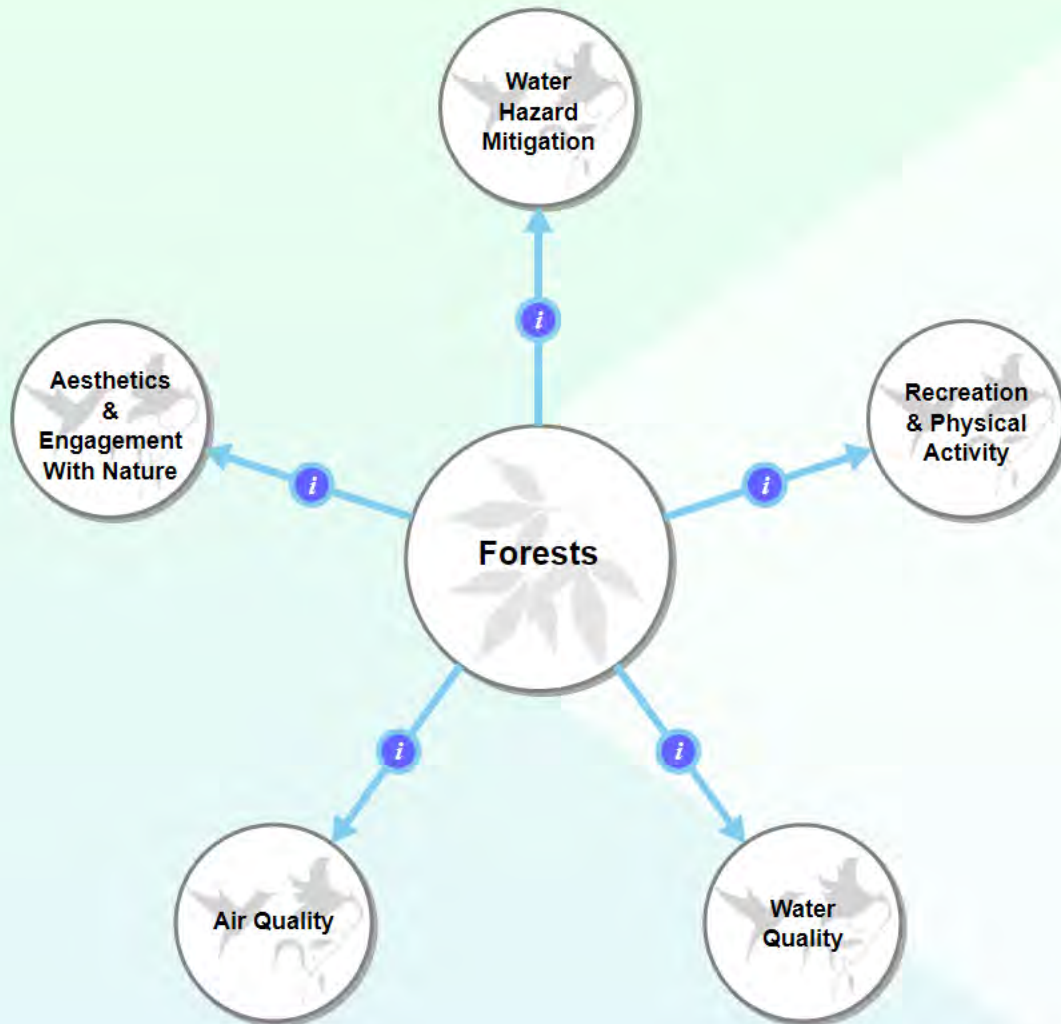


FIGURE 1. Schematic diagram of pathways by which climate change affects health, and concurrent direct-acting and modifying influences (environmental, social and health system factors) (Figure from IPCC 2007).54

How do Forests Impact Health?



Source: https://enviroatlas.epa.gov/enviroatlas/Tools/EcoHealth_RelationshipBrowser/index.html

The USDA Forest Service defines forest as land that is dominated by trees, where the crown cover equals or exceeds 10%, and the area is at least 0.4 hectare (one acre) in size and 37 meters (120 feet) in width. Agricultural and urban tree cover are not considered forest under this definition. There are multiple types of forests including tropical, wetland, and commercially managed forests. Forests are made up of different tree and plant species that vary according to climate, geography, and hydrology. Forests are often managed for the market goods that they provide, such as timber and paper products. Forests also provide many other services, such as water and air pollutant filtration, which would be virtually impossible to replace using technology. Forests are also commonly used for recreational activities such as fishing, hunting, and bird watching, and for restoring the mind and spirit.

References

[USDA Forest Service](#)
[Climate Change Impacts on Forests | US EPA](#)

How do Forests Impact Health (2)?

Forests supply many ecosystem services that help to create healthy living environments:

Flood mitigation

Maintaining water quality and soil fertility

Helping in erosion control

Sustaining food systems

Climate resilience; carbon sequestration and nitrogen fixation- Forests help to slow the rate of climate change by removing carbon dioxide from the atmosphere and storing it.

Woodlands and trees have a positive impact on air quality through deposition of pollutants to the vegetation canopy, reduction of summertime air temperatures, and decrease of ultraviolet radiation.

Forests also provide recreational, cultural, spiritual, and aesthetic services.

However, ecosystem services and goods that forests provide are threatened by deforestation, pollution, biodiversity degradation, and climate change.

Old Growth Forests and Human Health

Old forests fix large quantities of atmospheric CO₂, produce oxygen, create microclimates and irreplaceable habitats, in contrast to young forests and monoculture forests.

Old trees control below-ground conditions that are essential for tree regeneration.

Old trees produce phytochemicals with many biomedical properties.

Example: Fungi with untapped medicinal potential, including the Agarikon, *Fomitopsis officinalis* (currently being tested against the coronavirus disease 2019 (COVID-19)).

Large old trees are an important part of our cultural heritage, providing people with aesthetic, symbolic, religious, and historical cues.



“Synergistic pandemics” or multiple epidemics that co-occur in relation to harmful environmental and social conditions that interact to exacerbate risk

1990s Singer – SAVA syndemic (substance misuse, violence, and AIDS)

Syndemics

Sources:

Singer, M/ (1996). A dose of drugs, a touch of violence, a case of AIDS: conceptualizing the SAVA syndemic. *Free Inq Creat Sociol.* ; 24: 99-110

Caron RM, Adegboye ARA. COVID-19: A Syndemic Requiring an Integrated Approach for Marginalized Populations. *Front Public Health.* 2021 May 11;9:675280. doi: 10.3389/fpubh.2021.675280. PMID: 34046392; PMCID: PMC8144466.

Richard-Eaglin, A., Muirhead, L., Webb, M., & Randolph, S. D. (2022). A syndemic effect. *Nursing*, 52(1), 38–43. <https://doi.org/10.1097/01.nurse.0000803424.08667.c6>

Caron RM, Aytur SA. Assuring Healthy Populations During the COVID-19 Pandemic: Recognizing Women's Contributions in Addressing Syndemic Interactions. *Front Public Health.* 2022 May 27;10:856932. doi: 10.3389/fpubh.2022.856932. PMID: 35712273; PMCID: PMC9197070.

DHHS. (2021). <https://www.hhs.gov/blog/2021/05/27/syndemics-commitment-quitting-equitably.html>

The “syndemics” lens focuses attention on the need to address multiple intersecting crises, such as COVID-19, poor mental health, climate change, structural racism, loneliness/social isolation, and ongoing chronic disease epidemics (e.g., the opioid epidemic, obesity) .

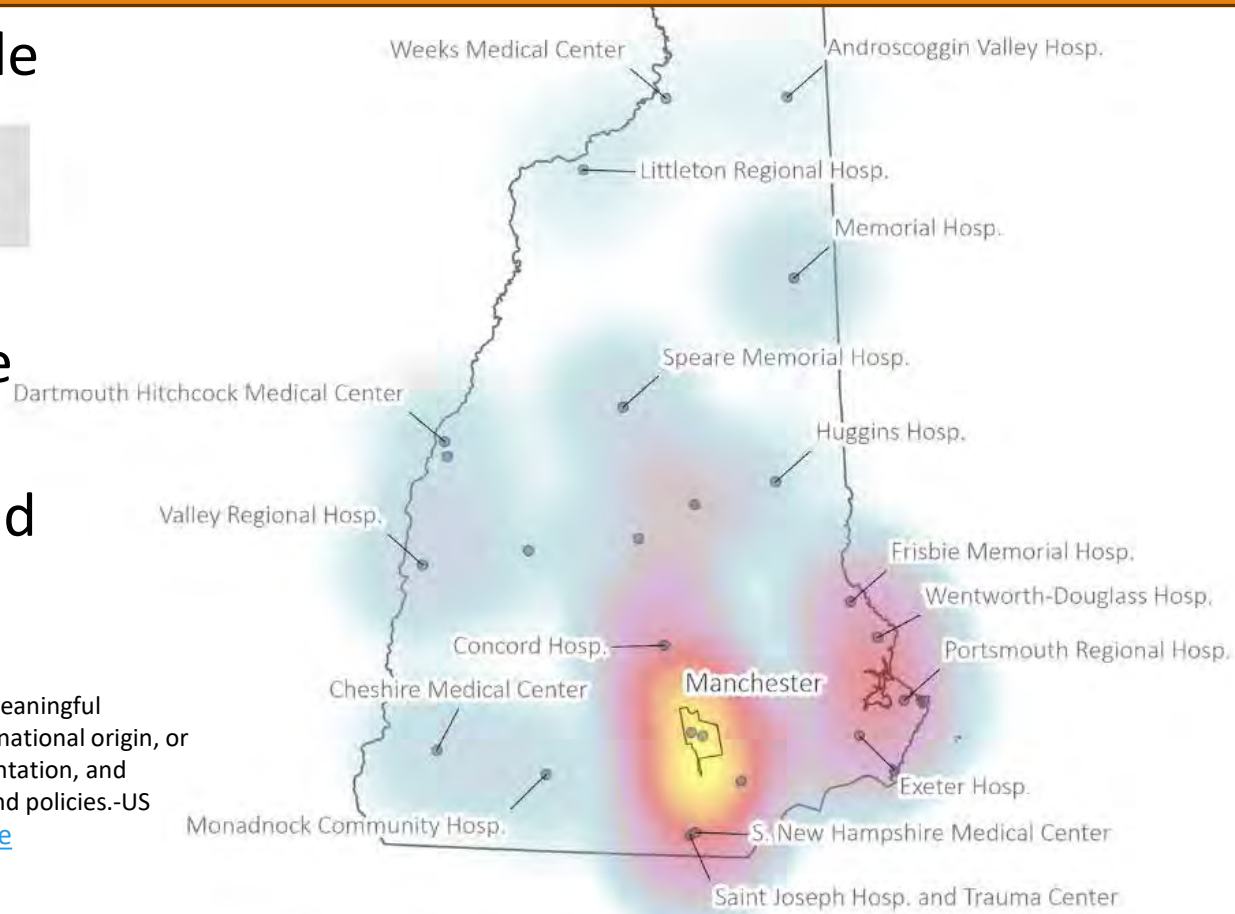
Addressing climate change and environmental factors may also help to prevent future syndemics, as a large proportion of emerging global disease threats are associated with climate-sensitive zoonotic diseases.

Heat Islands in NH

Trees can play a key role in mitigating heat islands.

Heat islands contribute to deaths and illness from cardiovascular and respiratory diseases.

"Environmental Justice" is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.-US EPA <https://www.epa.gov/environmentaljustice>



Heat Islands in NH:

<https://www.collaborativenh.org/environmental-justice-stories/2021/8/17/the-burdens-of-heat>

Transformational Resilience

A prevention-oriented approach for dealing with chronic syndemic stress

Strategies that enable us to care for ourselves and each other as we care for care for the planet

- Presencing- Connecting to personal goals values and using reflective techniques such as mindfulness to nourish self-care
- Purposing-Moving from 'I' to 'We' to support collective efficacy and advance social change



Interactive Sense of Place Activity-
Presencing and Purposing:
Photovoice



Photovoice

Photovoice is a Participatory Action Research (PAR) methodology, grounded in reciprocity, community development and social action.

Participants are given cameras and prompted to tell a story about their lived experience in pictures

Facilitated dialogue co-creates shared meaning-making to support collective efficacy

Can be applied in adaptation planning, community based participatory research (CBPR), Environmental Justice work, community health needs assessment, and other group settings

Wang C, Burris MA. Photovoice: concept, methodology, and use for participatory needs assessment. Health Educ Behav. 1997 Jun;24(3):369-87. doi: 10.1177/109019819702400309. PMID: 9158980

Mini-Photovoice Activity

- *What does being in nature (specifically forests) **mean** to you?*
- *How does being in the forest **feel** to you?*
- *Why are you engaged in the work that you do? What keeps you energized to do this work?*



Mini-Photovoice Activity

Instructions

1. Take a photo that reflects the prompt on the prior slide.

Write a caption (or phrase) that goes with your personal photo. Explain “What this photo means to me” and/or “this photo reflects my feelings of xxx”

2. Share individual photos and words/captions at your table

3. Find some common themes/words about the pictures at your table (how many of these same words/themes do we have at our table?)

4. As a group, select one photo from your table’s photos that best encapsulates the table’s themes

5. As a group, write a ‘group caption’ or word that reflects the group’s collective meaning of the photo

- (Group meaning-making)

6. Share #5 (e.g., via Padlet using the QR code)



➤ *What does being in nature (specifically forests) **mean** to you?*

➤ *How does being in the forest **feel** to you?*

➤ *Why are you engaged in the work that you do? What keeps you energized to do this work?*

Mini-Photovoice Activity-Part 2: Padlet Discussion

Instructions

1. We will upload all the photos and show all them photo 'tapestry'
2. Go around the room and have each table report out briefly on their table's collective meaning-making associated with their photo
3. At your table, as you hear about other tables' group meanings, note down which words/meanings were similar to your group's meanings in some way.

Draw connections about which themes resonate across tables

4. Pause and reflect on which of these themes may also resonate with some of the communities you work with.

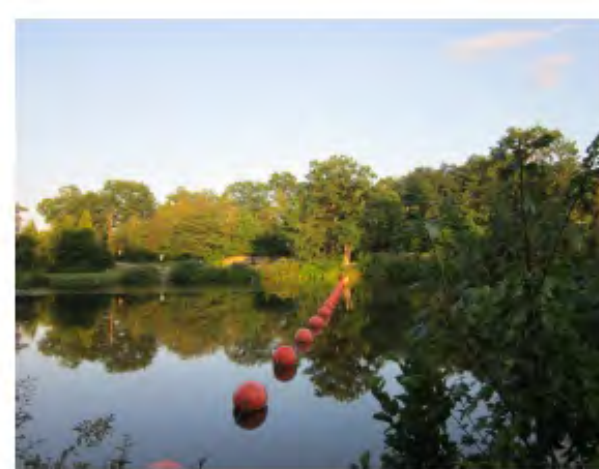
Access to places of
worship/sanctuaries

Access to trees and
natural resources

Source: Photovoice as a tool for
exploring active living from the
perspectives of older adults of color
and language minorities.

https://scholars.unh.edu/faculty_pubs/920/

Community Photovoice
Example from Older Adults
in NH



Nature Disparities and Equity: The Need for Nature

Communities of color are approximately three times more likely than white communities to live in “nature deprived” areas (those that have little to no access to parks, trails, and green spaces).

75% percent of non-white families with children live in a census tract (neighborhood) with less natural land than the state average.

Access to nature and outdoor experiences are key determinants of physical, emotional, cultural, and psychosocial wellbeing.

Sources:

The Nature Gap” <https://www.nationalgeographic.com/science/article/how-nature-deprived-neighborhoods-impact-health-people-of-color?loggedin=true>

Davis., L., Ramirez-Andreotta, M. (2021). Participatory Research for Environmental Justice: A Critical Interpretive Synthesis. Env Health Perspectives. <https://doi.org/10.1289/EHP6274>

Photovoice as a tool for exploring active living from the perspectives of older adults of color and language minorities. https://scholars.unh.edu/faculty_pubs/920/

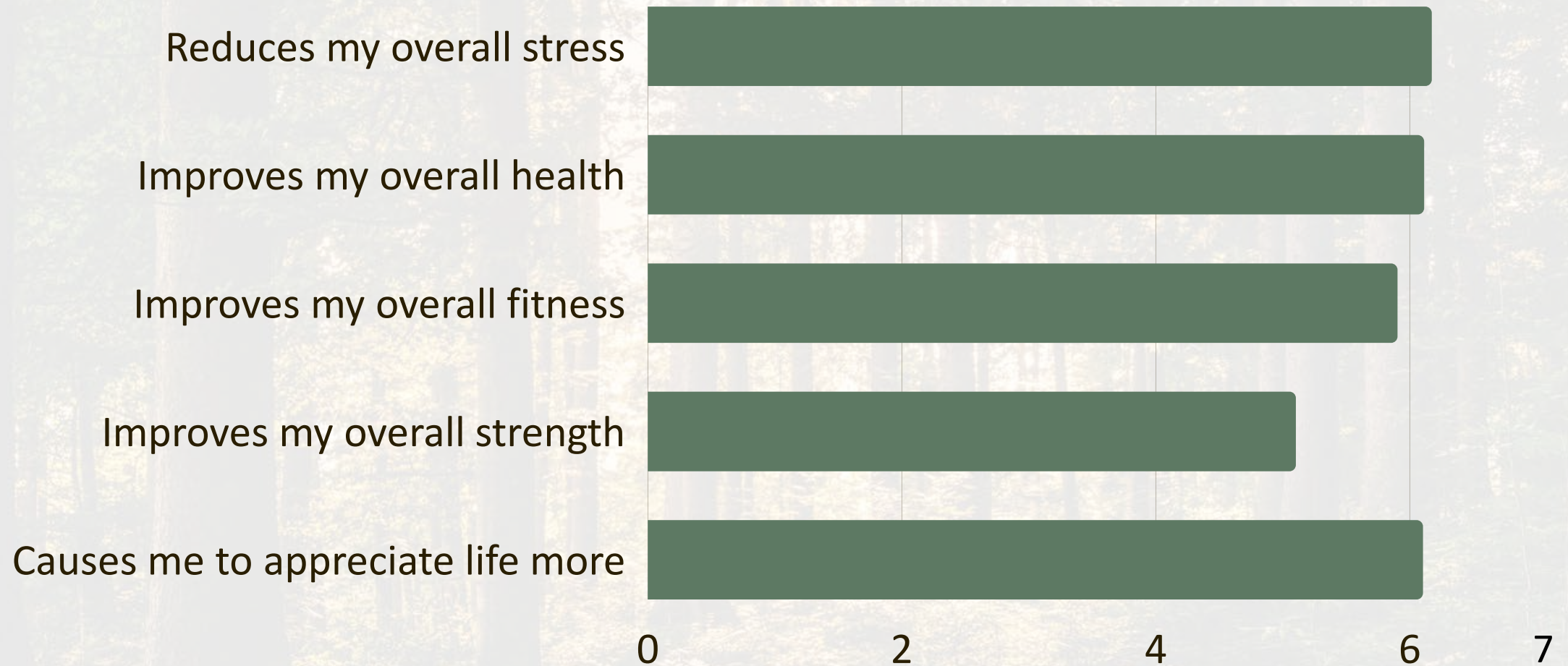


Case Study: College Woods (Ferguson et al., Under Review)

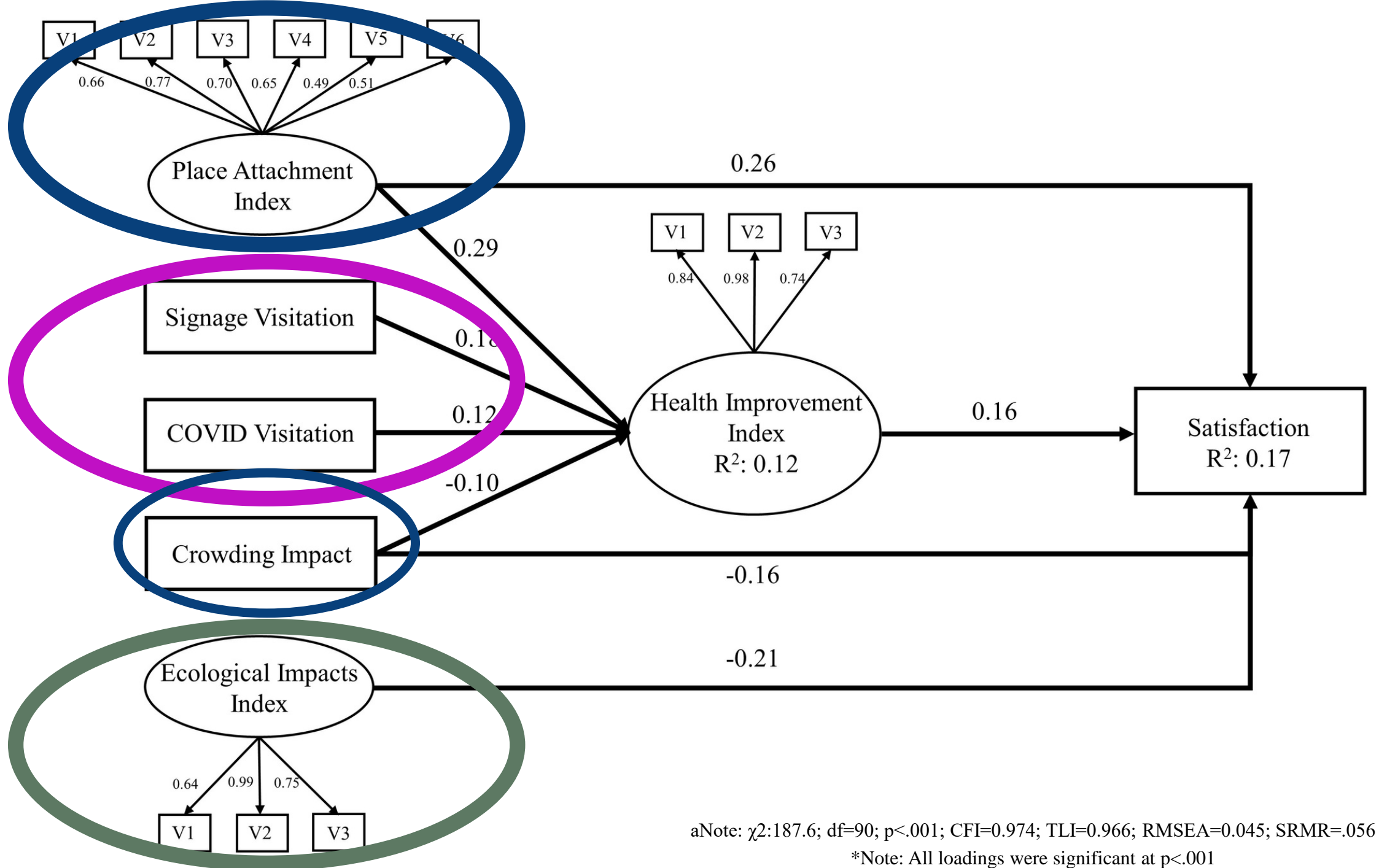


To what extent are visitors attaining health outcomes at CW?

Results: Mean Scores for Health Outcomes



*7 point scale, 1=not at all like me, 7=very much like me





Next Steps

- Measuring individual level health outcomes of spending time in nature areas v. urban: cortisol, oxytocin, heart rate, emotion, restoration
- Expanding beyond the college age student population
- Coupled Human Natural Systems: examining biodiversity and health outcomes simultaneously

Case study: Lye Brook Wilderness, VT

- Social, situational, and ecological factors on outdoor recreation visitor behaviors and decision making within the Lye Brook Congressionally Designated Wilderness (LBW) area in Vermont
- Data collected on site in the summer of 2021 (when VT experienced heavy rain)
- Visitors were negatively impacted by trail conditions (i.e. muddiness) and weather conditions (i.e. rain, humidity)
- Visitors were unable to cope with trail and weather conditions, likely decreasing their intention to return
- Empirical evidence – outdoor recreation participation will suffer during times of increased storms, precipitation, and flooding.



Case Study: NH Statewide Comprehensive Outdoor Recreation Plan (SCORP)

- Two separate surveys: residents & providers
- Measured five areas of potential climate change related impacts
 - Winter, summer, ecological, forests, and extreme weather



MOST SIGNIFICANT PERCEIVED CLIMATE IMPACTS



Shorter winter seasons

87%

Damage to rec infrastructure from storms

86%

Fluctuating water levels

74%

Warmer winter seasons

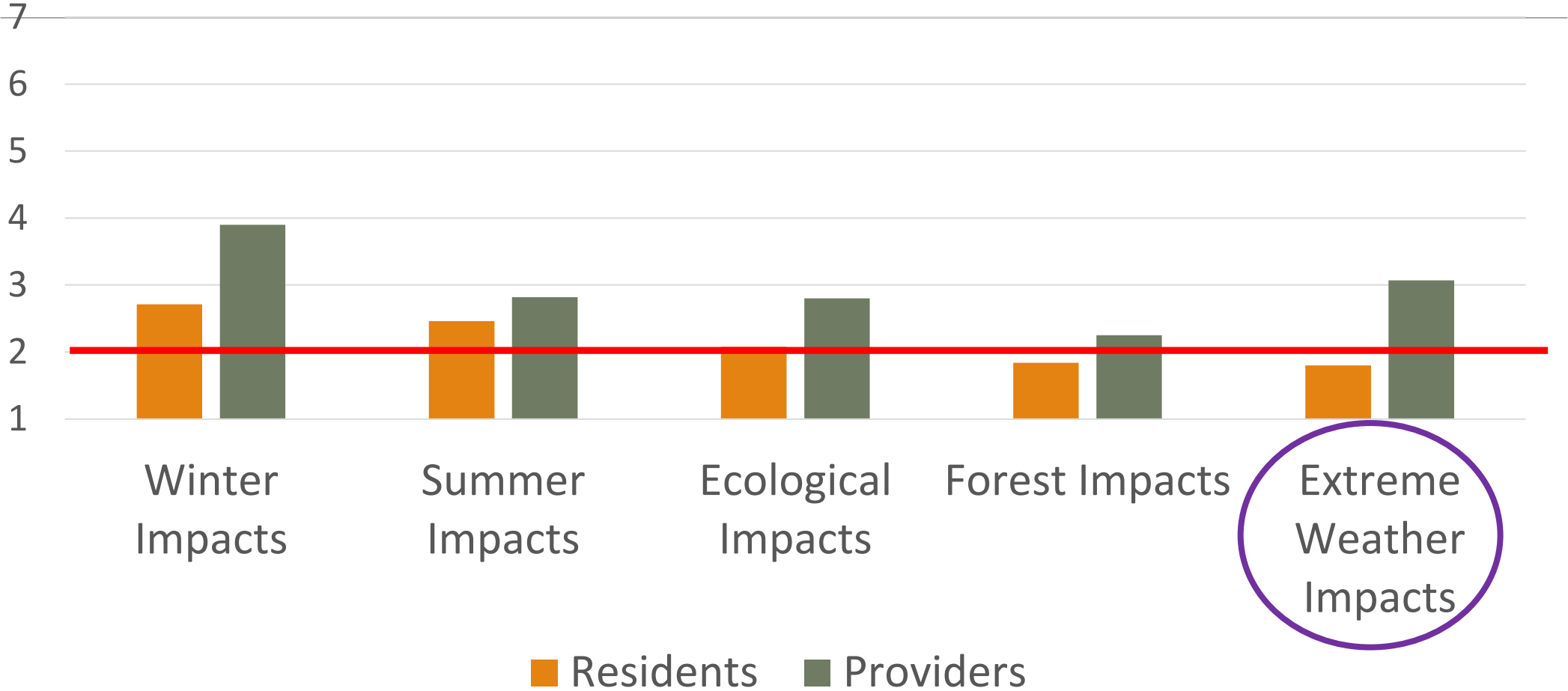
74%

Fewer days snow/ice coverage

72%

Figure 20: Provider Survey Perception of Most Significant Climate Impacts

Climate Impact Areas



**Measured on a 7-pt scales from 1 – 7, 1 = no impact, 7 = major impact*

Takeaways

1. Signage within forests helps with access – and health/wellbeing outcomes (place attachment is important too)
2. Extreme weather events will impact forest recreation
3. Design/redesign outdoor recreation areas to be adaptable to seasonal shifts.
4. Foster stewardship for New Hampshire outdoor recreation areas.



This is your brain on ACT+ Recreation Therapy:

Neural mechanisms of a mindfulness recreation therapy intervention for persons with chronic pain and disability

Semra Aytur, PhD, MPH; Jenna Campbell, PhD; Sarah Meier; Noah Waller; Tye Thompson, CTRS/L; Aird Mooers, LICSW, CTRS/L; Bronwyn Leto, CTRS/L; Jennifer Potter, PhD; Kristen Rosen, PhD, Kathryn Kanzler, PhD, Kimberly Ray, PhD, Robert Ross, PhD, Linda Mamakos, Joseph Haviland; Julia Bushell, Julia Mulhall, Jessica Davis, Evelyn DeRosa, Grace Roy, Ariana White and Donald A. Robin, PhD



Background

- Chronic pain (CP) has been recognized as one of the most important contributors to the Global Burden of Disease
- CP is a human rights issue
- CP causes more disability than any other medical condition in the U.S.^{1,2,3}
- 62.7% of patients suffer from CP 12 months after a major trauma⁴
- Opioid analgesics remain a frequently-prescribed intervention to treat chronic pain, posing health and safety risks, including hyperalgesia, misuse, and addiction⁵
- Patients need access to safe, non-opioid integrative and complementary practices that can address chronic pain and improve long-term functioning

Purpose

To evaluate the feasibility of broadening the scope of **Acceptance and Commitment Therapy (ACT)**, an evidence-supported mindfulness-based intervention, by training recreation therapy (RT) professionals to deliver ACT in a non-medical setting.

Intervention

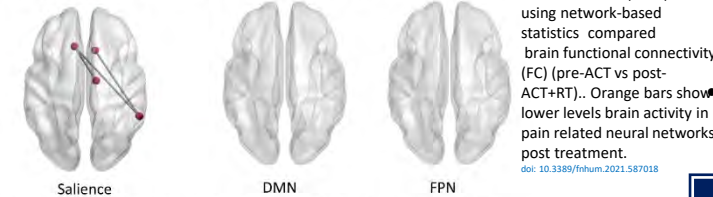
- ACT aims to promote mindful acceptance of the pain experience
- Aids long-term functioning by focusing on personally-meaningful values⁶
- Promotes *'psychological flexibility'*, the capacity to choose behaviors and responses based on personal goals and values⁷

Training

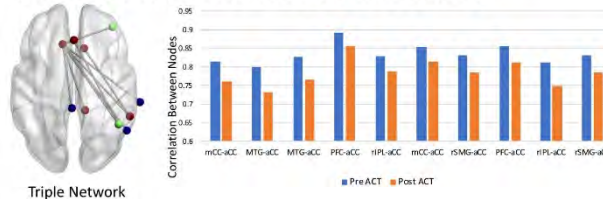
Certified therapeutic recreation specialists (CTRS/L) were trained to deliver ACT by a licensed clinical psychologist over a 3-day intensive training period, followed by 2 booster sessions, 2 mock sessions, and a feedback session following with video-recorded observations.

Main Findings

A Within Network Effects of ACT: Pre-ACT < Post-ACT



B Between Network Effects of ACT : Pre-ACT < Post-ACT



*Improvements for Satisfaction with Social Roles and Activities and the Acceptance and Action Questionnaire are indicated by a positive change score, improvement for the Depression measure are shown by a negative change score

Table 1. Outcomes	Change (Pre-Post Diff.Score)	SD	p-value
BPI, Pain Interference ⁸	-1.85	1.54	0.023
Depression (CES-D) ⁹	-6.11	5.84	0.027
FFMQ, Total ¹⁰	16.66	12.08	0.012
FFMQ, Acting ¹⁰	3.88	3.62	0.016
FFMQ, Non-judging ¹⁰	4.11	4.62	0.035
PTSD Checklist, PCL-5 ¹¹	-9.22	7.38	0.008
NeuroQoL, Depression ¹²	-3.44	3.28	0.014
Satisfaction with Social Roles	8.78	6.51	0.004
CPAQ	20.86	25.39	0.012
PROMIS, Pain Interference ¹³	-5.66	4.97	0.038
Sleep Disturbance	-3.22	3.99	0.023

Methods

- A pre-post, quasi-experimental design was used to evaluate N=9 patients with chronic musculoskeletal pain (mean age = 47.6) who were enrolled in a 4-week, group-based ACT intervention (90 minutes, 2x/week). Validated assessment tools were used to measure changes in self-reported behavioral outcomes pre-post ACT, using non-parametric statistical tests and t-tests.

Results

A 4-week **Acceptance and Commitment Therapy (ACT)** intervention, delivered by Certified Therapeutic Recreation Specialists (CTRS), was associated with **significant improvements in behavioral outcomes and quality of life among adults with chronic pain**. Statistically significant improvements were observed for: Pain Interference (PROMIS), Acceptance and Action (AAQ-II), Chronic Pain Acceptance (CPAQ), Depression (CESD), NeuroQoL, Mindfulness (FFMQ), PTSD, Satisfaction with Social Roles/Activities, Sleep, Fatigue, and Cognitive Function (Table 1).



Discussion & Conclusions

- This study demonstrates the feasibility of delivering ACT+RT in a non-clinical setting for persons with chronic pain
- Improvements in behavioral measures related to psychological flexibility and quality of life were observed
- Delivery by CTRSs was beneficial for this patient population, offering strategies on modifying activities and helping clients move forward in a value-oriented manner
- Findings will be used to inform larger trials and interventions tailored to the needs of persons suffering from chronic pain



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EPA ENVIRO ATLAS RELATIONSHIP BROWSER TOOL:

<https://www.epa.gov/enviroatlas/enviroatlas-eco-health-relationship-browser>

The Hope List:

<https://sway.office.com/jmoFYtZmWBfsaycO?ref=Link>

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