

Designing for well-being:

How the built environment shapes our health

A leading researcher in integrative medicine shares strategies for creating spaces that promote resilience and vitality

by *Colin Milner*

As the concept of the built environment evolves, the significance of design for enhancing health, well-being and resilience has never seemed more crucial. Internationally recognized for her discoveries, research scientist Esther Sternberg, MD, brings critical insights to the relationships between mind-body interaction, illness and healing, and the role of place in well-being.¹

Sternberg is research director at the Andrew Weil Center for Integrative Medicine; inaugural Andrew Weil Chair for Research in Integrative Medicine; director of the Institute on Place, Well-being and Performance; and professor of psychology and research professor of medicine, all at the University of Arizona in Tucson. Her most recent book, *Well at Work: Creating Well-Being in Any*

Workspace,² was named a Top Ten Lifestyle Book for Fall 2023 by Publisher's Weekly and longlisted for the OWL (Outstanding Works of Literature) Award.¹

In my roles as International Council on Active Aging® CEO and active-aging industry leader, I constantly seek ways that our industry can expand its wellness support for customers and team members. Dr. Sternberg's studies point to the impact of environmental factors on stress levels, productivity, and overall health and well-being. In this interview (extracted from an upcoming episode of the *Colin Milner Rethinks Aging With...*[™] podcast and edited specifically for the *Journal on Active Aging*®), Sternberg emphasizes the necessity of integrating the seven domains of integrative health—resilience, movement, relationships, sleep, nutrition, spirituality and environment—into workspace and living environment designs. She and I also explore the potential of innovative technologies, such as immersive reality environments,

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Dr. Esther Sternberg signs books at the ICAA Conference and Expo 2023 in Anaheim, California. Photo: Todd Studios Inc. Image courtesy of Dr. Esther Sternberg



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and multisensory “Recharge Rooms” that help enhance relaxation.

What lessons can active-aging professionals glean from integrating the seven domains of integrative health? And how can governments, organizations and communities implement strategies to create healthier, more resilient environments? From reevaluating misconceptions to charting a future where well-being is central, this discussion illuminates how thoughtful design can transform not just individual health, but societal and economic resilience also. Let’s dive in.

Workplace wellness overview

CM: *Let’s talk about your 2023 book, Well at Work. What’s different about this book compared to others on the same topic?*

ES: The main thesis of my book is bringing the principles of integrative health into the design of workspace built environments. There are plenty of books about ventilation, the built environment and return on investment. This book focuses on how to embed all the domains of integrative health into your workspace—wherever you work—to help you engage in these domains without even realizing it.

What also makes this book different is its structure, which is like a sandwich. The middle part consists of a chapter on each of the seven domains of integrative health. However, the first part of the book starts with the story of the researchers and my colleagues who began working in this area over 20 years ago, when we were essentially crying in the wilderness and nobody was listening. The C-suite executives often said they didn’t have the money for such well-being initiatives and wanted simple answers like how big the windows should be. It’s more complicated than that.

When my editor read the first few chapters, she said it was like setting up the Marvel Universe, introducing each character involved in this vision of creating

well-being workspaces. This part reads like a novel, telling how we came together and the research we conducted.

The final part of the “sandwich” is about the post-COVID-19 workspace. I describe what the University of Arizona did under the guidance of former United States Surgeon General Richard Carmona, who is now a distinguished faculty member at the university. They managed to balance mitigation and prevention of infectious spread to the extent possible while maintaining the financial viability of the institution. I also discuss the future of the post-COVID workspace and emerging technologies that can help create healthy and well-being workspaces.

Strengthening resilience

CM: *Many people are still struggling to move back into the workplace since the COVID public health emergency ended. Is there something we have learned that we didn’t know before? Is there something we should keep in mind as we think about the built environment?*

ES: Yes, there is. I’ve been in the business of measuring the impact of the built environment on health, well-being and performance for over 20 years, but COVID-19 really brought this to the forefront. People became acutely aware of the role the built environment plays in spread of and susceptibility to COVID, and indeed any infection. You have to remember, however, that whether you get sick from a virus depends on three factors: the dose to which you’re exposed, the duration of your exposure, and importantly, your resilience.

I think resilience got a little lost at the beginning of COVID because we focused heavily on preventing and mitigating exposure through measures that could reduce the dose and duration of exposure, like adequate ventilation, frequent air turnover, MERV 13 air filtration, masking and distancing. But, it is imperative to also design the built envi-

ronment to enhance resilience, whether it’s where you work, live, learn or play.

This is the focus of my book. Enhancing resilience is key because while you can’t eliminate viruses, you can strengthen your ability to withstand them through integrative health approaches.

CM: *Are we paying attention to that message?*

ES: Not enough, honestly. It’s easier to focus on ventilation and physical fixes. People are tired of COVID; we just want to get back to normal life. To enhance resilience, however, we need to engage in the healthy activities of integrative health.

According to the Andrew Weil Center for Integrative Medicine, there are seven domains of integrative health: resilience (the stress and relaxation response, how quickly you bounce back), movement, relationships, sleep, nutrition, spirituality, and the environment (including fresh air, removing molds and toxins, combating off-gassing, and importantly, access and exposure to nature).³ All these factors contribute to building your resilience.

CM: *What percentage of the population do you think does all those things?*

ES: Relatively few. Because it’s hard to do everything, which is another point I bring out in the book. On January 1st, everyone says they’ll start going to the gym and they’ll exercise every day, but not many of us are still doing that by March 1st. I’ve spoken to Fortune 500 chief wellness officers and chief medical officers, and they’ve tried various ways to engage people in these healthy activities for illness prevention. It’s not just about preventing viral illness; it’s also about cardiovascular disease, high blood pressure, diabetes and more.

But it’s difficult to make people engage in these activities consistently. They

have to actively participate in daily exercise, maintain healthy relationships and get adequate sleep. Wearable health-tracking devices, like rings or various watches, can help monitor these activities, but many people don't like being reminded by their watch to get up and move more.

If you design the built environment correctly, people will passively engage in these activities without even realizing it. We know this from research we conducted with the United States General Services Administration (GSA).² Nearly 25 years ago, I started working with Kevin Kampschroer, who was then research director at the GSA and went on to become director of the Office of Federal High-Performance Green Buildings and the chief sustainability officer for the GSA. Why is this important? The

GSA builds and operates all nonmilitary federal buildings in the US and worldwide—libraries, courthouses, embassies, and more—totaling over 370 million square feet of office space and serving over two million office workers.

When Kevin first approached me in 2000, I was at the National Institutes of Health (NIH), where I spent 26 years in the intramural research program studying stress and illness. Kevin asked if I could help measure the impact of these millions of square feet of office space on the health, well-being and performance of federal workers.

We began using wearable devices, which back then were quite rudimentary—large devices glued to the chest with wires and electrodes. I tested one myself for two-and-a-half days to ensure it was

feasible; though not pleasant, it was possible. We equipped federal workers who agreed to participate in the study, comparing the impact of retrofitted office space versus old, legacy office space. With six-foot-high wall cubicles, the old space was dark, musty, with poor airflow and high mechanical noise. Many of us have worked in such environments at some point.

In the new space, they eliminated cubicles in favor of open office designs with multiple seating choices, windows with views to the outside, and bright full-spectrum morning sunlight, low mechanical noise, and fresh air turnover. Still, I was surprised when people in the new space proved to be significantly less stressed than those in the old space^{4,5,2}—

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Dr. Esther Sternberg, pictured at right with Dr. Andrew Weil and Studio Elsewhere CEO Mirelle Phillips, visits the construction site of the new Andrew Weil Center for Integrative Medicine building complex at the University of Arizona, Tucson. Image courtesy of Dr. Esther Sternberg

perhaps because I took for granted that space didn't really affect the physiological stress response. Interestingly, for individuals in the old space, higher stress levels continued when they went home at night and while they were sleeping, yet they were not conscious of being stressed.^{4,5,2}

We continued these studies after I moved to the University of Arizona, using the latest state-of-the-art wearable health-tracking devices to measure hundreds of office workers and linked the health data to continuous real-time environmental measurements in four different federal buildings. We found the same results: People who moved more during the day were less stressed at night, had better sleep quality and better moods, and were less fatigued the following day. The physiological stress response was lower in open, airy office spaces compared to private offices or cubicles, where people moved less.^{6,2} This research helped us develop a prescription for a healthy building by considering various elements such as light, sound, office layout, temperature and humidity.

The cost of wellness

CM: *If I'm a developer, I may hear the above and think, "Cha-ching, cha-ching, cha-ching." As it will cost me a fair amount of money to replace these things, what is my return on investment?"*

ES: Your return on investment is substantial. Your largest expenditure over the years, no question, is the people who work for your organization. It's worth the upfront expense to create healthy, well-being spaces and not just to change the ventilation and filtration, which is easy and essential but not enough to create a well-being space.

You need to incorporate bright morning sunlight, circadian lighting from 8 a.m. to 12 noon, to ensure healthy sleep patterns. People exposed to early morning sunlight fall asleep faster, have better quality sleep, and experience less depression and better moods the next day, making them more functional.^{7,2} You want your workforce to perform optimally, and if you don't pay attention to the factors that enhance their performance, you'll end up losing money.

Other important factors are temperature and humidity. What we found is that it's not just the heat, but the humidity that matters. If the humidity is outside the comfort zone of 30–60% relative humidity—either too dry or too wet—the stress response is 25% higher.^{8,2} If your workforce has 25% higher physiological stress levels every single day, and they're not even aware of it, this cumulative stress will become medically relevant and predispose them to illness.

CM: *So, we have people who could potentially be predisposed to illness, eventually raising the cost of insurance and lowering productivity. What if they have all these elements at work to help them stay healthy and well, but they come home to a less-than-optimal living space? Let's say they move to a community where people live on top of each other, with narrow hallways and poor ventilation. How would this impact their health, and would it minimize the benefits they experienced at work?*

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Ten takeaways for active-aging professionals

Dr. Esther Sternberg's insights have significant implications for active-aging organizations, particularly senior living communities. The key points highlighted below, extrapolated from the main discussion, demonstrate how the design of these communities can enhance the quality of life for older adults and staff.

The world is navigating a new era since the COVID public health emergency ended. The senior living industry has an opportunity to lead the way in creating resilient, health-focused living spaces that support the seven domains of integrative health and cater to the evolving needs of an aging population.

1. **Enhancing resilience.** As older adults are more vulnerable to illnesses and stress, designing environments that promote resilience is crucial for their well-being and quality of life.
2. **Encouraging movement.** Incorporating design elements that encourage physical activity and movement can help older adults maintain mobility, independence and overall health.
3. **Fostering relationships.** Senior living communities should create spaces that facilitate social interactions and relationships, as they are essential for mental and emotional well-being.
4. **Promoting healthy sleep.** Ensuring that senior living environments support healthy sleep patterns through appropriate lighting, temperature and humidity control can contribute to better health outcomes.
5. **Providing access to nature.** Integrating nature-inspired elements and green spaces within communities can reduce stress and improve overall well-being.
6. **Implementing technology.** Utilizing technology, such as immersive reality environments, can provide older adults with engaging experiences and promote relaxation.
7. **Adopting best practices from hospitality.** Senior living communities can learn from the hospitality industry to create welcoming, comfortable and well-being-focused environments.
8. **Reducing healthcare costs.** By investing in environments that promote health and well-being, organizations can potentially reduce healthcare costs associated with age-related illnesses and conditions.
9. **Attracting and retaining residents.** Offering living spaces that prioritize well-being and support the seven domains of integrative health can be a competitive advantage in attracting and retaining residents.
10. **Preparing for future challenges.** As the aging population grows and the world adapts to the newer COVID and potentially other viral realities, senior living communities that prioritize well-being and resilience will be better positioned to meet the evolving needs of older adults.

ES: That's a great question. The concept of my book on creating well-being workspaces applies to any space, including homes, learning spaces, and living spaces. Whether you work from home or return to a less-than-ideal living environment, you can still create a well-being space.

To counteract the issues at home, you can use technologies that expose you to full spectrum sunlight at the right time of day, such as light boxes. These have been used for decades to treat seasonal affective disorder (which comes from low exposure to light in the winter). Placing a light box near your work area can be beneficial.

To manage humidity, consider using a local humidifier near your desk or where you sleep. It's crucial to keep them clean to prevent mold and bacteria growth, staying within the optimal humidity range of 30–60%. Temperature comfort is also important; heated office chairs, similar to heated car seats, can help maintain comfort without adjusting the whole room's temperature.

From our studies with the GSA, we learned that one size does not fit all.² Historically, office buildings were designed with a one-size-fits-all approach, which doesn't work well for anyone. Local solutions for thermal comfort, noise mitigation and lighting can significantly improve individual comfort and overall well-being.

The role of technology

CM: *What are we learning about the impact that technology can have beyond what we've just discussed? For example, are we now beginning to see things like sensory rooms in houses, automatic temperature shifts, and conversations with [voice assistant] Alexa to reduce loneliness and create an engaged household? What's happening out there?*

ES: There's definitely a lot of that happening. However, I believe you can

go a bit overboard. Personally, I don't have conversations with Alexa, Siri or similar devices—I prefer actual human interaction. But there are certainly advancements in technology that can enhance well-being. For instance, lighting fixtures that adjust to the circadian rhythm, changing from bright blue light in the morning to redder light in the evening, are becoming more common.

Mariana Figueiro, PhD, a colleague who worked with the GSA (she's now at Mount Sinai in New York), and an expert in lighting, conducted studies with submariners who are not exposed to sunlight for months. She implemented systems that simulated bright circadian morning light and red light in the evening. You can purchase these types of light bulbs and integrate them into a smart home system to achieve similar benefits.

CM: *We talk a lot about behavior change in public health. Much of this discussion revolves around people changing their behaviors as well as their environments. But I'm curious about how someone's identity affects their behaviors, especially since our identities change over time. How does identity influence what we do and how we behave?*

ES: First, let's address the point that place shapes behavior. If you don't have a space that encourages movement, you're not going to move. In office buildings, if the stairwells are dark, dank and scary, people won't take the stairs. However, if the stairwells are light and airy, and even used as gathering spaces, people will move more. My book gives lots of examples of buildings designed this way.

A recent survey by the GSA found that people working from home move less

than those going into the office because they say they sit in their home office doing Zoom calls.² To combat this, you need to schedule movement just as you schedule appointments and calls. For example, I live in Tucson, Arizona, where I can swim practically all year round. I purposefully schedule my swims at the beginning, end or middle of the day and arrange my calls around that to prioritize my health.

We need to be proactive about our health and well-being. If swimming isn't an option, you can get up and take a walk. Walking in nature, if you live near a natural area, is incredibly healthy and reduces stress. Your identity, including how you see yourself in terms of health and activity, will influence how you

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incorporate these behaviors into your daily life.

CM: *What excites you the most in the technology space?*

ES: One of the things I'm really excited about right now is immersive reality spaces. I tell the story in my book about an amazing young woman, Mirelle Phillips. Before COVID, she was a video game designer, but after a serious accident and neurotrauma, she was in and out of hospitals. She read my previous book, *Healing Spaces: The Science of Place and Well-Being*, which inspired her to pivot from video game design to creating immersive reality spaces.

In 2019, Phillips started Studio Elsewhere in New York City, where she developed these immersive virtual reality

spaces that simulate being in nature. When COVID-19 hit, she was in that city, where healthcare providers were facing tremendous burnout and mental health challenges. She quickly adapted and set up Recharge Rooms® in more than 70 hospitals across the country, now with over a million users.

[Mount Sinai's] research shows that these Recharge Rooms® substantially reduce burnout and anxiety as well as improve sleep quality and moods.^{9,2} The rooms are darkened with a few plants and comfortable chairs facing a white wall on which images of different nature scenes are projected. You can say, "Elsewhere, take me to a quiet mountain lake," and the wall transforms into a serene lake scene, complete with the sounds of lapping waves and chirping birds. This technology, made accessible

to anyone, can significantly help people recharge and reduce stress.

CM: *Do you think immersive reality will become commonplace in different workplaces as a recharging option?*

ES: I really think it can and should become commonplace. Disney does this [immersive reality] all the time, but what Phillips did was apply it to burnout in hospitals, and now she's expanding it to other settings. This kind of technology would be achievable and highly beneficial for senior living communities and any office space. It's a work in progress, but it holds great potential.

Another significant issue post-COVID, which my book addresses, is the anticipated downtown apocalypse when leases are up. Companies are shrinking

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their footprints as occupancy of downtown high-rise towers remains down. Attracting the workforce back to the office is a huge challenge. Simply fixing the ventilation isn't enough. You can't expect workers to return to six-foot-high cubicle walls with no views of, or access to, nature.

The hospitality industry, including Disney, understands how to create appealing environments. For example, I live 10 minutes away from several world-class spas in Tucson. People aren't forced to go to these spas; they want to go because the spaces are designed to make them feel relaxed and well. The entertainment and hospitality industries know how to create these inviting environments, and office spaces need to incorporate similar amenities to engage employees and attract them back to the office.

So, why should we go into the office if we can work perfectly well from home? The single biggest reason is social interactions. Relationships are one of the seven domains of integrative health and are crucial for well-being. Office environments need to offer different sizes and types of spaces to enhance social interactions of various sizes [in order] to encourage more people to come back to work and reap the benefits of these interactions. Without appropriately designed spaces, fewer people will be motivated to return to the office.

CM: *Let's talk about resilience and everything that comes with it. We need to figure out how to become more resilient through the built environment, as individuals, as a workforce, and as a society.*

ES: I want to emphasize the definition of resilience. Think about a rubber band:

When you stretch a new rubber band and let go, it bounces back right away. If it's an old, overused rubber band, you stretch it, and it just hangs loose. The first example is resilient; the second is not. It's not about being healthy all the time—that's impossible. You will get sick and stressed, but the goal is to bounce back as quickly as possible to your healthiest self.

To achieve this, you must engage in all seven domains of integrative health: sleep, resilience, green and healthy environments, spirituality, nutrition, relationships, and movement. These domains overlap and are interconnected, making it challenging to engage actively and purposefully in each one. The thesis of my book is that if we design our

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Resources

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Esther Sternberg, MD

<https://esthersternberg.com/>

Studio Elsewhere

<https://www.studioelsewhere.co/>

University of Arizona Andrew Weil Center for Integrative Medicine

<https://awcim.arizona.edu/>

University of Arizona College of Medicine: Esther M. Sternberg, MD

<https://medicine.arizona.edu/person/esther-m-sternberg-md>

University of Arizona Institute on Place, Wellbeing, and Performance

<https://ipwp.arizona.edu/>

WELL-International WELL Building Institute

<https://www.wellcertified.com/>

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workspaces to help us engage in these domains without even thinking about it, we will be more resilient.

Enhancing resilience means being more resistant to viral infections and any kind of illness. There's a wealth of literature in the stress domain showing that chronic stress predisposes individuals to more frequent and severe viral infections and lowers the effectiveness of vaccines.² By enhancing your resilience, you'll not only be less ill when you do get sick, but you'll also be more resistant because you can mount the right kind of antibody response when vaccinated.

Resilience is incredibly important. And the built environment can play an essential role in fostering it. At this point in our global experience, having well-being built environments and workspaces is no longer a luxury—it's an imperative.🌀

Colin Milner, CEO and founder of the International Council on Active Aging®, is a leading authority on the health and well-being of the older adult. The World Economic Forum has recognized Milner as one of "the most innovative and influential minds" in the world on aging-related topics. The award-winning writer and speaker has stimulated business and government leaders, industry professionals and older adults worldwide with his incisive and inspiring perspectives. In 2010, canfitpro [Canadian Fitness Professionals] presented Milner with its Lifetime Achievement Award for his contributions to the Canadian fitness industry.

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