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STANFORD LIFESTYLE MEDICINE

FALL / 2022



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An Introduction: Stanford Lifestyle Medicine

Our team, research, upcoming projects, and how we plan to bring life to your years.



We've all heard it: behaviors such as consuming a diet high in processed food, extended periods of inactivity, irregular or disrupted sleep, and chronic stress can have severe implications for our health. Now more than ever, as we grab a quick snack and settle into a far-from-ergonomic kitchen chair for Zoom calls, these recommendations can be easy to ignore. Even during challenging times, there are actions each one of us can take to improve our overall wellbeing and create lasting positive outcomes for our future health. And that's what Lifestyle Medicine is all about.

Lifestyle Medicine is a growing medical field that utilizes an evidence-based approach to develop behavioral interventions to prevent and treat chronic disease and promote health and longevity. Stanford Lifestyle Medicine focuses on seven fundamental areas: healthful nutrition,

movement and exercise, restorative sleep, stress management, social engagement, gratitude and reflection, and cognitive enhancement. Through research-based interventions in each of these areas, every one of us can achieve our most optimal levels of health and performance throughout our lifetime.

Lifestyle behaviors are highly interrelated. Heading out for a mid-afternoon walk or run may help you process mounting stress, and even help you get those necessary Zs at night. A good night's sleep may help you manage the tasks ahead the next day, and this added productivity may help you find the time to reach out to a friend and get back out there for another walk. These positive effects may snowball from this day to the next, even from that one behavioral change. [Studies](#) focusing on singular behavioral changes are limited in nature, but [research](#) shows that implementing multiple lifestyle changes

From the
Experts:
Michael Fredericson, MD



“My goal in creating Stanford Lifestyle Medicine was to bring together a team of Stanford doctors and researchers who could translate the most cutting-edge research and innovations in Lifestyle Medicine to healthcare providers and the general public. From its beginnings, Stanford Lifestyle Medicine has aimed to provide research-based recommendations from our own research and the highest-level research being conducted in areas of Lifestyle Medicine today. We have expanded on the American College of Lifestyle Medicine pillars to include seven pillars of focus: Movement & Exercise, Healthful Nutrition, Restorative Sleep, Stress Management, Social Engagement, Cognitive Enhancement, and Gratitude & Reflection. Within each pillar, we aim to emphasize how they impact the areas of Longevity, Health, and Performance. We currently have five areas of current and future development that include:

1. Research led by our team, mentoring of student research, and offering seed funding grants to stimulate new explorations.
2. Pre-Medical and medical education here at Stanford University.
3. Community education through online resources, newsletters, and podcasts.
4. Reviews of technology and partnerships with innovative companies impacting the Lifestyle Medicine space.
5. The integration of Lifestyle Medicine by Stanford faculty in the clinical space.”

No matter your age, lifestyle behaviors are a powerful way to improve quality of life and longevity. Lifestyle behaviors implemented early in life can greatly impact early childhood development and lead to lasting effects during our lifetime. [Positive lifestyle behaviors during childhood](#) can help us manage obesity and the risk of cardiovascular and metabolic disease throughout our lives. But does this mean that the power of lifestyle medicine diminishes as we get older? It does not. In fact, for the aging population, behavioral changes such as spending time outside and continuing to stay engaged with family and friends can renew resilience and promote [improvements to physical health](#). From youth to old age, and every stage in between there is a plethora of interconnected lifestyle changes we can make to improve our mental and physical health and increase our longevity.

Why is Lifestyle Medicine Relevant?

The United States' estimated life expectancy has increased by over thirteen percent since 1960, and the world's [estimated](#) life expectancy has increased by over thirty eight percent in that same time frame. [By 2030](#), each will grow by another two percent. But this increased longevity is [not expected](#) to correlate with an increased quality of life. The good news is, expectations are not set in stone. Lifestyle Medicine is an essential aspect of our individual, and collective, future health.

Chronic disease is one of the largest factors affecting individuals' quality of life and longevity. In the United States, 6 in 10 adults have one chronic disease, and 4 in 10 adults have two or more chronic diseases. These chronic illnesses make up the leading causes of death in the US and drive the nation's \$3.8 trillion [annual health-care cost](#), as chronic disease accounts for about 75% of the nation's [healthcare expenditures](#). The monetary and physical costs of chronic disease are unsustainable. [Studies](#) show that at least 80% of heart disease, stroke, and type 2 diabetes, and at least 40% of cancers can be prevented and treated through lifestyle changes. Utilizing lifestyle behaviors provides a cost-effective and feasible solution for chronic disease.

Unfortunately, there are many obstacles that can impede an individual's ability to make impactful behavioral change. Individuals faced with poverty or racial inequities experience significant hurdles that must be recognized. Recent projections from the Urban Institute [estimate](#) that 13.7% of families in the United States live below the federal poverty line (FPL), and 45% of households live only within 200% of the FPL. For a family of four, this is an [an-](#)

[nual](#) household income of \$26,500 and \$53,000 respectively. Studies show that individuals living in poverty are more likely to experience significant psychological distress than higher income individuals. This psychological distress [increases the likelihood](#) of developing chronic obstructive pulmonary disease, heart disease, and diabetes. Low income individuals are also [more likely](#) to engage in substance use, and [experience obesity](#). Only 38.4% of teens living below the poverty line meet the Center for Disease Control's [recommended](#) daily activity level, as opposed to 66.8% of teenagers in upper income households.

Financial insecurity disproportionately affects minority households. While 9.6% of individuals [living below the FPL](#) identify as white, a staggering 18.1% identify as Black, and 21.9% identify as Hispanic. On a global level, Black and Hispanic individuals report a larger level of stress than white counterparts. For Black individuals, this stress is also [reportedly](#) accompanied by larger levels of subsequent distress. [Studies](#) show that the stress experienced by minority individuals leads to a higher likelihood of developing chronic conditions and engaging in unhealthy behaviors.

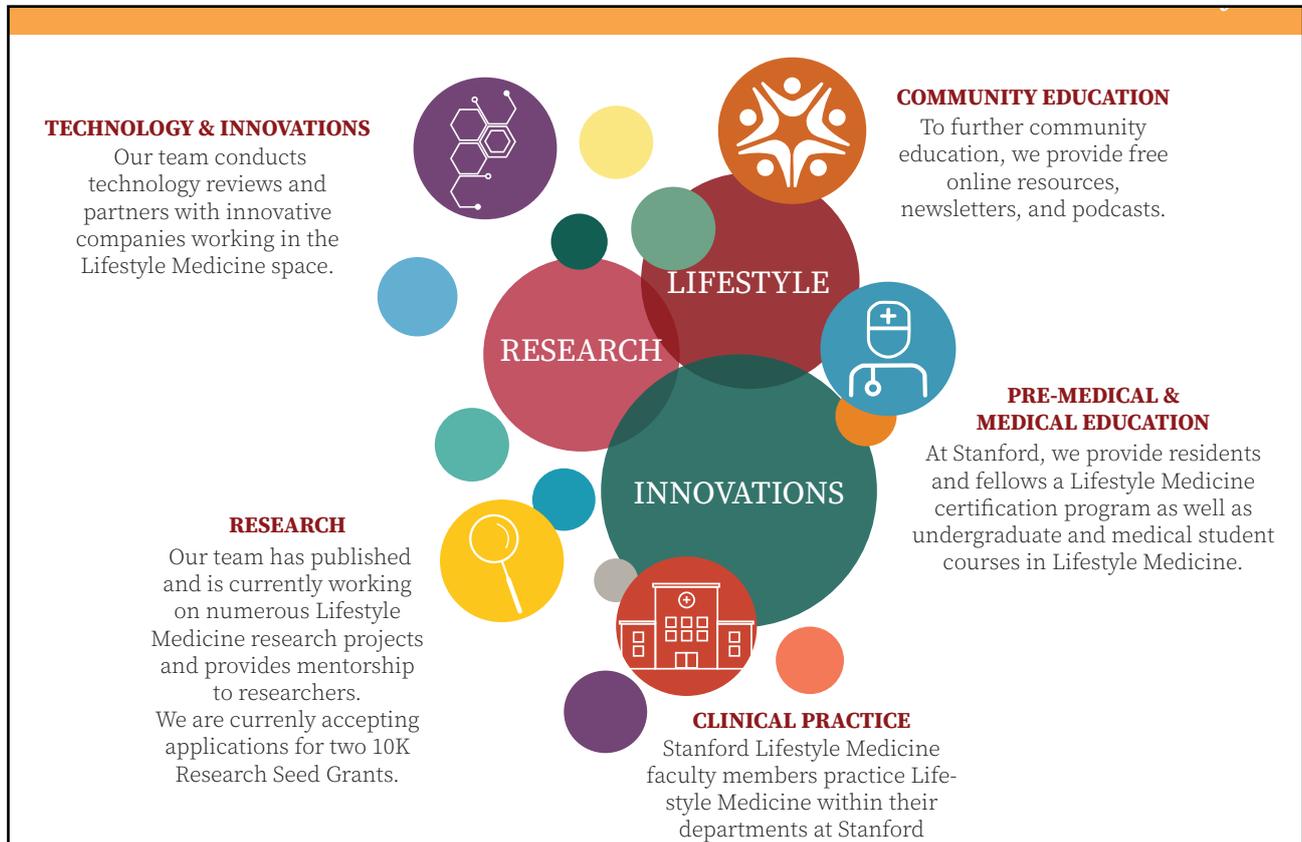
Wearable Devices and Community Programs

Obstacles such as poverty and racial inequality may only be tackled by collective attention to these issues. Wearable devices, such as FitBit, have gained popularity in hopes of increasing positive lifestyle behaviors. Fitness trackers offer many unique benefits including: movement cues to the user following periods of inactivity; fitness challenges and badges awarded for their completion; and access to health information such as heart rate and activity level. Although useful on the onset, fitness trackers have [not been found](#) to correlate with lasting changes to lifestyle behaviors. Continued research in this area is necessary to determine the best approach to ensure long term efficacy of these devices for their users. Another limitation of wearable devices is that they are often not as accessible to lower income individuals. According to research, our most impactful means for promoting behavioral changes are community programming, environmental re-engineering in schools and workplaces, and collaborative, lasting relationships between individuals and their healthcare providers. The American College of Sports Medicine initiative Exercise is Medicine® developed the [Rx for Health](#) series aimed at providing physicians with educational information on physical exercise. The information targets several stages of development such as, 'Staying active when frail'. Additionally, this series offers guidance

“Only 38.4% of teens living below the poverty line meet the Center for Disease Control’s recommended daily activity level, as opposed to 66.8% of teenagers in upper income households.”

Longevity, Health, and Performance

is the lens through which Stanford Lifestyle Medicine aims to focus our research and educational missions. We work within five avenues: professional education, community education, technology, research, and clinical space to further develop and to reach more people:



for overcoming social and public health obstacles like, ‘Keeping children active during the pandemic’, as well as specific exercise prescriptions for a variety of chronic diseases. Programs such as this help physicians bring Lifestyle Medicine to the forefront of patient care.

In Oakland, California, Stephen and Ayesha Curry are spearheading community programming aimed at making positive lifestyle changes for children. Their Fountain, Eat. Learn. Play., focuses on three pillar areas: nutrition, education, and fitness. By delivering food directly to students and their families, as well as advocating for partisan policies at the US congressional level, Eat. Learn. Play. is working to improve children’s access to free, nutritious food. Eat. Learn. Play. has also partnered with grassroots organizations and schools to provide students’ with age appropriate literature, and increase early childhood literacy in Oakland. Low rates of childhood literacy disproportionately affect Black and Latinx students, with only 19% and 24% of Black and Latinx students respectively reading at age level in Oakland. This can have lasting effects for their cognitive enhancement later in life. The Curry’s are also making positive changes to childhood fitness in the Oakland community by funding the remodeling of community playgrounds and green space. Eat. Learn. Play. is also creating joyful and activity-focused community events, and advocating for increased physical education time in elementary schools. Through constructive projects targeting the fundamental pillars of fitness, nutrition and cognition, the Curry’s and their team at Eat. Learn. Play. are helping to make community wide changes and subsequently helping individuals create lasting lifestyle habits. You can learn more about their Foundation and its impacts here: <https://www.eatlearn-play.org/>

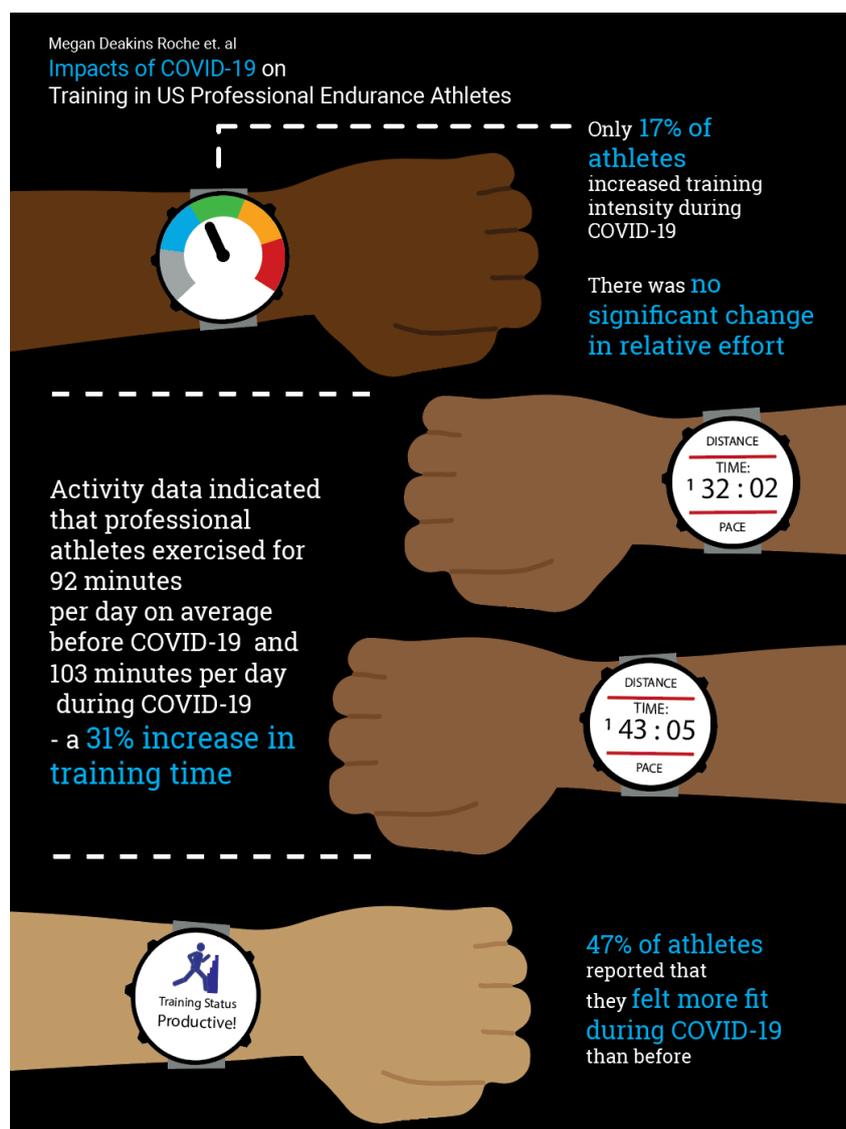
“Stanford Lifestyle Medicine will provide cutting edge Lifestyle Medicine research through newsletters, podcasts, and on-line content.”

SLM Program and Mission

Stanford Lifestyle Medicine aims to improve individual and population health through our seven pillars: nutrition, fitness, sleep, stress management, social relationships, gratitude, and cognitive enhancement. Weeding through the flood of disinformation and opinion-based health advice is nothing short of exhausting. This is why Stanford Lifestyle Medicine aims to provide research-based recommendations targeting areas of health and performance across a lifespan. This will be done through the creation of newsletters, podcasts, and online content that break down complex research and make it available for everyone. By doing so, we aim to make it easier for each person to gain the knowledge needed to reach their optimal mental and physical health. SLM will also partner with companies at the forefront of technological advancements that seek to promote positive lifestyle outcomes.

Key Team Members

Our program is structured as a collaboration between experts across all of our fields. Our Program Director, Michael Frederison, MD, Professor and Head of PM&R Sports Medicine, Department of Orthopaedic Surgery is a leader in Health Promotion, Fitness, and Rehabilitation. He is also Co-Director at the Stanford Center on Longevity. Our Program Coordinator is Megan Roche, MD, PhD candidate in Epidemiology and Population Health, with research focusing on bone health and athletics. Dr. Roche is also a 5-time national trail running champion, North American Mountain Running Champion and six-time member of Team USA and recently completed her Fellowship with the Stanford Center on Longevity as a New Map of Life Fellow. Assistant Program Director, Douglas Noordsy, MD is Clinical Professor and Director of Lifestyle Psychiatry at Stanford. Dr. Noordsy is the head of our Lifestyle Cognitive and Brain Health. Sarita Khemani, MD is a Clinical Associate Professor of Medicine and Neurosurgery Hospital Medicine physician and is head of our Stress and Neuroscience. Marily Oppezzo, PhD, MS, RDN, is a learning and behavioral scientist, and an Instructor of Medicine with the Stanford Prevention Research Center and a sports dietitian with Stanford's Run-



Safe program. Dr. Oppezzo is head of Nutrition and Behavioral Change. Rusly Harsono, MD, MSc, MBA, FAAP, DipABLM is a pediatrician and Clinical Assistant Professor of Pediatrics and Critical Care at Stanford University School of Medicine. Dr. Harsono is head of Social Engagement. Cheri Mah, MD, MS, is a researcher at Stanford Sleep Disorders Clinic and Research Laboratory focusing on sleep and athletic performance. Cheri is head of Restorative Sleep.

Our team members include: Neha Shah, MD, Michelle Hauser, MD, MS, MPA, FACLM, Chef, Scott Delp, PhD, Bruce Feldstein, MD, BCC, Emily Kraus, MD, Matt Smuck, MD, Marcia Stefanick, PhD, and Brigid Riedy, who is joining as the New Map of Life Fellow at the Stanford Center on Longevity. As we continue to grow, we are branching beyond Stanford and also working with students at Columbia, Vanderbilt, and Case Western Reserve. Our resident and Student contributors include: Paige Dyrek,

MD, Matthew Kaufman, MD, Xian Li, MD, Ben Maines, MS, Maya Shetty, who will be joining us as a Lifestyle Medicine Fellow, Zainab Shirazi, MD, and Thea Swenson, MD.

Featured Team Research

The Stanford Lifestyle Medicine team recently conducted a study among the Strava, the largest internet activity tracking and social networking platform, user population. This study investigated the effects of COVID-19 on professional athlete's training and mental health. This cross-sectional study utilized survey responses as well as the GPS tracked and self-reported activity data of 114 consenting participants. Data was analyzed as two time periods, 'before-COVID' (January 1, 2020- March 14, 2020) and 'during-COVID' (March 15 2020- August 25, 2020).

Our team found a significant increase in duration of exercise from

an average of 92 minutes per day before COVID-19 to 103 minutes per day during COVID-19. Despite this, there was no significant increase in intensity of activities. Additionally, this study found a significant increase in reported depressive and anxious feelings in professional athletes during COVID-19, despite an increase in average activity time. This research demonstrates the importance of access to mental health resources for professional athletes as well as a call to destigmatize seeking mental health support within the professional athlete community. To read more from this study, please visit our website [here](#).

Pillars

By conducting extensive research and consulting with medical experts, Stanford Lifestyle Medicine developed a seven-pillar approach to Lifestyle Medicine, which expands on the 6-pillar approach designed by the American College of Lifestyle Medicine. These seven pillars are: nutrition, fitness, sleep, stress management, social relationships, gratitude, and cognitive enhancement. At Stanford, we know that each pillar is of equal importance for individual and public health and that each pillar works best (and naturally) in tandem with one another to promote longevity, health and performance.



Movement and Exercise

Physical activity has long been understood as an integral part of our wellbeing but, in a [review article](#) by Stanford Lifestyle Medicine director, Michael Fredericson, MD, physical activity was shown to be one of the most important lifestyle factors of the 21st century; affecting mortality, and every major organ system in our bodies. In short, physical activity can affect more than just the size of our muscles. Physical activity can [help](#) us overcome stress, decrease our risk for osteoporosis, and can even [help](#) us retain and

build cortical thickness, which is important in the prevention of neuropathology such as Alzheimer's. A [recent study](#) from Stanford University tracked the molecular changes from Stanford University tracked the molecular changes that occur in individuals' bodies after just 9-10 minutes of aerobic exercise. This study found that of the 17,662 molecules analyzed, 9,815 underwent changes after exercise. An initial response highlighted increases in energy metabolism, oxidative stress, and immune response. Following this, a secondary response occurred increasing energy homeostasis, tissue repair, and tissue remodeling. Now, whether you're looking to improve your mile time or improve your daily function, you may be thinking, how can I even begin to make sense of the changes taking place in 9,815 molecules? Or, you may be thinking, how can I optimize all these changes for my athletic performance? We understand the complexity of this pillar and we aim to provide the latest research.



Healthful Nutrition

Recently, public focus on nutrition has skyrocketed, you may have noticed even Disney Pixar's input on the topic featured in their latest hit movie, Soul, "Seriously, stay away from those processed foods!" Open discussion and knowledge of these pillars are crucial, but the ever-emergence of 'fad diets' and opinion-based recommendations only serve to increase confusion over the nutrition pillar. [Research](#) has shown that the Mediterranean diet, which emphasizes a plant-focused diet high in healthy fats, especially olive oil, along with occasional fish or poultry, has been shown to reduce inflammation and delay mortality. A small yet salient [study](#) demonstrated that transitioning to a plant-based diet can lead to immediate alterations to your gut's microbiome. Changes in gut bacteria can have a [positive effect](#) on an individual's mental health and processing power. Another [study](#) from Stanford found that adding fermented foods such as yogurt, or kimchi to your diet also helps to increase your



microbiome. That seems like no big deal but, this study also found these changes led to decreased activation of four types of immune cells and a decrease in the levels of 19 inflammatory proteins present in our blood. One of the 19 proteins is associated with increased risk of type 2 diabetes, rheumatoid arthritis, and chronic stress. I'll take extra kimchi please!



Restorative Sleep

In the age of blue light and constant notifications, getting adequate sleep is not always a walk in the park. Sleep is a restorative period for our bodies, and [lack of sleep](#) can lead to decreased cognition in the short term, and in the long term: increased

risk of depression, heart disease, kidney disease, high blood pressure, diabetes, and stroke. But, finding ways to ensure a full night's rest can lead to improvements in all of these areas including another interesting one: immunity. Restful sleep can [help](#) to improve the flow and distribution of T cells, increase interactions between antigen presenting cells and helper T cells, and increase our immune response. While sleep can improve our internal functioning, it is also crucial for our everyday functioning and performance. Better sleep can [help](#) athletes or any active individual, improve competitive success, responsiveness, and decrease the likelihood of injury.

Stress Management



Experiencing stress was a crucial part of human evolutionary development. When our ancestors were faced with impending danger, the stress response we know as 'fight or flight' kicked in and helped necessitate the appropriate actions for survival.

Today, this stress response, though still useful when we find ourselves in precarious situations, has more often than not gone a little haywire. Stress caused by work or day to day challenges has left many of us in a state of chronic stress. [Chronic stress](#) can lead to severe health implications such as: frequent headaches, anxiety and depression, decreased cognitive function, skin irritation, muscle aches, heart disease, nausea, weight gain, kidney disease, irregular menstruation in women, and immune suppression, to name a few. Experiencing chronic stress puts our health at risk due to the release of two major hormones, adrenaline, and cortisol. When released, adrenaline increases your heart rate, elevated your blood pressure and boosts energy. Cortisol, on the other hand, increases glucose in the bloodstream, and decreases function of non-essential systems such as the immune system, reproductive system, and the digestive system to name a few. It may be easy to see constant release of these hormones due to chronic stress may create some issues. Through lifestyle and behavioral changes, individuals can develop techniques to manage stress and its negative effects. Through lifestyle and behavioral changes, individuals can develop techniques to manage stress and its negative effects. [Studies](#) show that implementing regular meditation practice can reduce chronic stress levels. Chronic stress can become be display itself in many ways, for some this may mean aches and pains, insomnia, changes in social behavior or changes in appetite. For those whose

chronic stress results in negative eating behaviors such as emotional and binge eating, regular meditation can help to reduce those symptoms and aid weight management. We turn to 'comfort food' during times of chronic stress because that great taste actually has physiological effects on our stress systems. When stress hormones and our neural stress-response network increase, so does our motivation for food. These same mechanisms decrease our executive functioning, making it harder to deal with the stressor, and increase our emotional response. High-caloric foods offer temporary relief of these symptoms, but the short-lived relief often becomes cyclical, and leads to weight gain. Treating chronic stress with mindfulness meditation [helps](#) individuals manage weight by mitigating our hormonal and emotional stress response. Mindfulness meditation also improves our executive functioning in the wake of stress, making it easier to deal with our stressors and implement actionable changes to decrease and manage stress moving forward.



Social Engagement

After experiencing the isolation of the COVID-19 pandemic, it is no surprise social relationships are a necessity for our mental and physical health. Stanford's Center for Compassion and Altruistic Research and Education (CCARE) [emphasizes](#) that

strong relationships may help individuals develop better emotional regulation, self-esteem, empathy, lower rates of anxiety, strengthen immunity and decrease risk of morbidity. It is not necessary that these relationships are large in quantity, but instead CCARE Director, Dr. Emma Seppala, notes it is the quality of these relationships that matter most. For instance, the quality of the relationship children share with their parents from birth has implications for their sleep quality and early childhood development.

[Research](#) shows strong mother-child and father-child relationships are positively correlated to the quality of a child's sleep at night, and sleep, as we know, has significant effects on many aspects of our health and development. Social relationships have even been [shown](#) to aid recovery. In individuals with implanted cardioverter to aid cardiovascular recovery. In individuals with implanted

“Strong relationships may help individuals develop better emotional regulation, self esteem, empathy, lower rates of anxiety, strengthen immunity, and even increase the chance of longevity by 50%.”

cardioverter-defibrillators, strong social relationships have been found to help these individuals achieve cardiovascular recovery in response to stress. And for those looking for some motivation for physical activity, we can say confidently that going out for a run with your local running group or running buddy will make that run far more enjoyable.

The importance of intergenerational relationships is something our partners at Stanford Center on Longevity know very well. A recent systematic review of the impact on intergenerational relationship on the aging population clearly illustrated the incredible benefits these relationships have on overall health and the ability to remain living independently. Social relationships with kindergarten to third grade students showed improvements in physical health, psychosocial health, cognitive function, social relationships, physical activity, and social activity for aging adults. Structured intergenerational social activities also demonstrated significant impacts on function limitation, depression, executive function and memory, brain activity/volume, social support, walking, physical activity excluding walking, sedentary activity, social interaction, quality of life, social isolation, and social tie. Research in this area is only just beginning but shows clear importance for both the aging populations and youth.

Gratitude and Reflection



Implementing a gratitude practice can occur at any stage of our lives.

[Practicing gratitude](#) has lasting effects on our cognition, sleep, relationships, and reduces the risk of social anxiety and depression. Over time, the [effects](#) of grateful living increase resilience to adverse life events, satisfaction

with life, and overall positive emotions. [For the aging population](#), continuing to engage in activities that induce gratitude, such as spending time with others, enjoying the outdoors, and completing pleasurable tasks, can lower functional disability, and help individuals retain their episodic memory as well as speed of information processing. Expressions of gratitude can not only be impactful for our own health and our relationships, but research shows expressing gratitude to another can improve their quality of life as well. In a recent [study](#) coworkers were asked to read letters of gratitude aloud to each other as they sat face to face. This simple interaction led to significant improvement in the listeners mood and activated sections of their brain associated with affect. So tell someone you are thankful for them and see the benefits for yourself and them.



Cognitive Enhancement

Cognitive enhancement can occur at any stage of life. Aristotle believed that the young mind resembled soft, malleable wax and the old mind was

hardened wax, unable to be reformed. This belief has persisted through time and has left some individuals to simply accept that their cognition will wane. Research shows that for many, this is more of a self fulfilling prophecy than anything. Older individuals are [more likely](#)

to practice 'memory avoidance' and not trust their own cognitive abilities compared to young adults. Unfortunately, the belief that we all have to experience mental decline as we age [causes](#) fear and reluctance to utilize our cognition to the fullest extent. But, this does not have to be the case. If we engage in meaningful activities, maintain social relationships, and stay active as we age, [research](#) shows we can enhance our cognition and even delay the onset of Alzheimer's and other degenerative neurological diseases. In future newsletters we will be taking a deep dive into ways to promote cognitive enhancement and counteract the lingering words of Aristotle, so make sure to stay tuned.

That was a lot of information...

We know. But that's the beautiful thing. Research in lifestyle medicine is booming and we are so fortunate to be in a position to learn and benefit from all the fantastic research going on in the field today. Stanford Lifestyle Medicine will continue to provide you with updates on the most cutting edge innovations in longevity, health, and performance. With the science-based recommendations we provide, we know you will be able to take control of your health, become an active patient when visiting your doctors, and even help influence those around you to lead a more healthful life.

Stay Connected:

At Stanford Lifestyle Medicine we are constantly working to bring you the most cutting edge research on all topics relating to Lifestyle Medicine.

Make sure to keep an eye out for our next newsletter that takes a deep dive into Epigenetics and Lifestyle Medicine. For more information on all things Lifestyle Medicine please visit our webpage at: lifestylemedicine.stanford.edu

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