CENTER *for*
BRAINHEALTH®
THE UNIVERSITY OF TEXAS AT DALLAS

Women's Brain Health

Unlocking the Potential of the Female Brain

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Introduction

For decades, brain science has treated men and women as biologically the same – with the male brain as the standard.

The brain is an endocrine organ, and hormones are potent modulators of learning and memory. Yet, science has long treated women's brains like male brains with extra estrogen.

We now know this is not the case. The female brain undergoes extraordinary transformations across life stages, from pregnancy to menopause, and is both highly adaptive and uniquely resilient.

Empowering Women to Take Charge of their Brains

At Center for BrainHealth, we believe understanding these distinctions can unlock untapped potential. We aim to educate, empower, engage and equip people with tools to proactively strengthen their brains, building resilience, reducing stress and burnout, and enhancing cognitive well-being at every life stage.

Center for BrainHealth recently hosted Empowering Women Through BrainHealth, a conference that brought together some of the leading voices in women's brain health to share the latest scientific breakthroughs and provide practical strategies for women to implement in their communities and organizations.

This white paper draws on those discussions, exploring the dynamic and resilient characteristics of the female brain and outlines actionable strategies for women to take agency over their brain health, starting now.

BEING A WOMAN
IS NOT A PATHOLOGY
FOR THE BRAIN.
IT'S A SUPERPOWER.

New collaborations coming out of the event are sure to continue propelling the science forward, creating an ecosystem that leads to more understanding and self agency.

The Maternal Brain

The human brain undergoes major restructuring events through adolescence and continues to evolve as it ages. Women experience two additional, extensive waves of neural remodeling: during pregnancy and perimenopause. Rather than viewing these transitions as periods of vulnerability, we should seek out opportunities to unlock new potential for brain resilience and performance.

Nearly 85% of women give birth in their lifetime, yet the maternal brain is vastly understudied.[1] In fact, the first study mapping brain changes in a woman from preconception through two years postpartum was only published in 2024. It turns out no part of the brain is untouched in the transition to motherhood, with pregnancy triggering widespread neural restructuring – not unlike the synaptic "pruning" known to occur in the adolescent brain.[2]

Pregnancy leads to significant increases in white matter integrity, strengthening neural networks that support maternal behavior, cognitive flexibility and resilience.

Understanding these kinds of extraordinary changes in the maternal brain not only helps women navigate this life stage but may also lead to broader insights to improve brain health for everyone: for example, how brain plasticity can be influenced by hormonal changes and transitions.

"Progress in neuroscience will flourish when the health of people of all genders is valued equally."

Emily Jacobs, PhD
UC Santa Barbara

The Perimenopausal Brain

As women transition beyond their childbearing years, menopause causes estrogen levels to decline, triggering another wave of neural restructuring. This shift can affect executive functioning and increase vulnerability to mood disorders or Alzheimer's. But the brain also has a unique ability to recalibrate after menopause.

Emerging research suggests the brain can find new neural pathways to help gain cognitive strength.

From a biological viewpoint, living beyond reproductive years suggests an evolutionary and social advantage for the unique role of women. For decades post-menopause, women contribute wisdom, leadership and care that strengthens their families and communities. This transition should be valued as a powerful new phase of cognitive potential rather than a period of decline.

Emerging evidence points to a window of opportunity at the onset of menopause for hormone therapy to help support long-term brain resilience. Proactive strategies like hormone therapy, cognitive training and lifestyle adjustments can help promote executive function, mental clarity and cognitive reserves, in order to extend the human brain span as a vital element of longevity.

"Women spend their lives climbing this mountain — career, family, personal growth — always pushing upward. Then menopause hits and it's like falling off a cliff. But it doesn't have to be that way."

Jessica Shepherd, MD
Sanctum Med + Wellness

The Mentally Fit Brain

Women are twice as likely as men to experience mood disorders. Modern stressors, from digital overload to shifting workplace cultures, can make it difficult to feel present and engaged. Chronic stress can dull joy, leading to anhedonia, a reduced ability to find pleasure in everyday life. Only recently named in the context of high-functioning depression, **anhedonia** is characterized by meeting one's daily responsibilities while experiencing general feelings of sadness, helplessness or a lack of fulfillment.[3] Naming this experience can empower individuals to take the first step in reclaiming their joy and sense of personal connection. Rather than waiting for a mental health crisis to prioritize brain health, women at every stage of life can make conscious, everyday choices to engage in meaningful activities that cultivate stronger, more resilient brains.

"You are not a human doing ... you are human being. Take agency to intentionally create points of joy every day and better understand the science of your happiness. After all, there will only ever be one you."

Judith Joseph, MD, MBA
NYU, Manhattan Behavioral Medicine

Alzheimer's and the Resilient Brain

Women are living longer, healthier lives, and their brains demonstrate remarkable resilience – even in the face of disease and decline.

The higher risk of women developing Alzheimer's is well documented, but new research reveals that women with a diagnosis also tend to maintain higher cognitive function for a longer period of time, suggesting that unique protective factors on the X chromosome may play a role in the progression of the disease among women.[4] By leveraging factors that promote resilience, women can take a strength-based approach to brain aging, while also advocating for better brain health in their communities. Research shows that by proactively managing the effects of age and menopause, women can experience thriving brain function well into their golden years.

"Brain resilience is rooted in our genetic architecture."

Gillian Coughlan, PhD
Harvard, Mass General Research Institute

The Nourished Brain

What you eat today shapes the health and function of your brain — not just now, but over the course of your life.

Women's hormonal profiles influence nutrient absorption, making it especially important to prioritize neuroprotective food groups. Particularly, polyphenol-rich foods such as fruits, veggies, tea and cocoa.

Foods high in antioxidants help reduce inflammation and support executive function, including memory, problem-solving and cognitive flexibility.

Rather than chasing individual "superfoods," women can improve their brain health right now and into the future by focusing on a well-rounded diet full of polyphenols.

"The benefits of brain-healthy eating go beyond the individual. Women are often the CEO of their families, meaning that when they adopt brain-healthy eating, they positively influence their entire family."

Annie Fenn, MD
The Brain Health Kitchen

The Rested Brain

Sleep is instrumental to optimal brain functioning, yet women are more likely to experience sleep disruptions over their lifetimes due to hormonal fluctuations, caregiving responsibilities and anxiety disorders. Despite typically needing more sleep per night than men (about 11 minutes more on average!), women are 40% more likely to have insomnia.[5] What's worse, women who are under-slept are 2.5 times more vulnerable to stress reactivity, reduced emotional regulation and impaired cognitive processes than when they are well-rested.

"Women need to be especially protective of their own sleep and feel empowered to recognize that getting the sleep they need is okay."

Matthew Walker, PhD
UC Berkeley

Future Technology: The Digital Twin Brain

What if you could see how your brain would age into the future? Now, what if you could see how your brain would age differently if you made different lifestyle choices? A Twin Digital Brain is like a flight simulator for anticipating brain changes over time, holding the potential to motivate proactive behaviors today, prompted by a glimpse into the future.

Emerging technologies drive the concept of the Digital Twin Brain, an AI model that simulates an individual's brain and can provide insights into how life changes will impact the brain. This technology holds special promise for women, as a vehicle for helping them visualize how their brain will respond to pregnancy and menopause, as well as lifestyle and daily habits.

By integrating the latest AI tools with a new movement of research focused on the female brain, interdisciplinary researchers can accelerate discoveries and create highly-personalized and adaptive brain health training, deepening opportunities for individuals to optimize their brain health.

"The future of brain health is personal, predictive, and powered by AI."

Nina Miolane, PhD
UC Santa Barbara

Leading the Brain Health Movement

Center for BrainHealth is conducting The BrainHealth Project, a landmark longitudinal study, aiming to uncover the dynamic relationship between lifestyle factors, biological markers, brain training and cognitive performance, with the eventual goal of developing personalized strategies for better lifelong brain health.

A key element of the Project is the BrainHealth Index, a novel metric to track holistic brain health over time – including improvement. Measuring factors of brain health like clarity, connectedness and emotional balance, the Index allows continuing participants to track brain changes over time while practicing strategies to improve well-being, social interactions and cognition.[6]

The BrainHealth Project is showing what's possible now. Brain training is a powerful lever for change, and women are leading the charge, engaging in the Project and showing measurable gains, regardless of age or starting point. These results demonstrate the power of brain performance training to drive real, sustainable improvements. [7]

By conducting functional MRI scans with a subset of this unprecedentedly large sample of women, we can connect self-reported gains with physical changes in the brain, creating a powerful tool for understanding brain health from multiple perspectives.[7] This growing data set makes the Center a tremendous resource for understanding many of the topics addressed in this white paper and a leading hub for cross-disciplinary research.

Combining what we know — and what we're still discovering — about women's brain health, the Project encourages proactive engagement in strengths-based strategies that strengthen brain performance and unlock potential at every age.

When women actively prioritize their cognitive well-being, the benefits extend beyond the individual, creating a positive ripple effect across families, workplaces and communities. As a growing force in the brain health movement, women are helping to lead a broader cultural shift toward the brain health revolution.

NOW IN ITS FIFTH YEAR,

THE PROJECT HAS ENROLLED THREE TIMES AS MANY WOMEN AS MEN,

GIVING AN UNUSUALLY BROAD WINDOW INTO WOMEN'S BRAIN HEALTH.

Conclusion

This conference underscored that women's brain health is starting to break through in the scientific community, but public understanding of women's brain health needs to catch up. Top researchers and experts are making bold new inroads to understand the unique characteristics of women's brains – and we need to keep this momentum going.

Collaboration is essential to continue advancing the science and amplifying both awareness and action. As more women engage in brain health research – whether as scientists or as study participants – new knowledge in the field will benefit brain health for all. Through innovative, collaborative research such as The BrainHealth Project, the Center for BrainHealth is uncovering new science and empowering women to act on it, strengthening brain potential across every life stage.

"We want empowerment for yourself and the families you care for, organizations you lead, and communities you are a part of."

Sandra Bond Chapman, PhD
Center for BrainHealth

What We Know, and What We Can Do

- The female brain is highly adaptable and resilient, with two unique periods of neural remodeling – during pregnancy and perimenopause.
- Because brain health is influenced by and adapts to hormonal changes, more focused science is needed to understand factors specific to women.
- Brain optimization at every life stage has been shown to be possible, and emerging research on the female brain may ultimately benefit all of humanity.
- Better brain health and wellness can begin NOW. There is already so much we know about strengthening the brain's health that can be applied today – ranging from brain-healthy eating and prioritizing quality sleep, to adopting daily habits and strategies to build social connections and engage in deeper-level thinking.

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The Maternal Brain

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Leading the Brain Health Movement

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