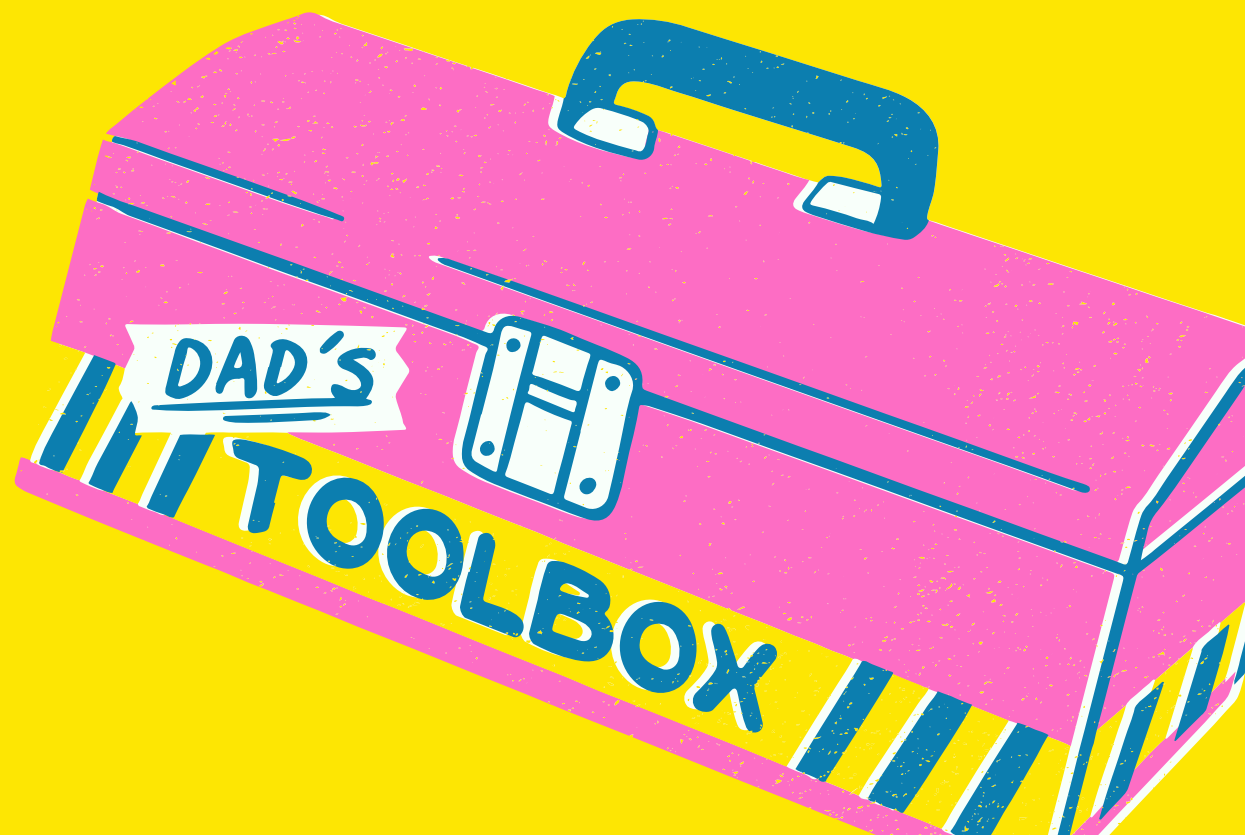


* Stress & Resilience Across the Transition to Parenthood *

Darby Saxbe, Ph.D



Thanks for the opportunity to speak to you!

- I am a professor, researcher, and clinical psychologist who studies close relationships in transition, with a focus on the transition to fatherhood
- I received my Ph.D at UCLA and am now a professor at the University of Southern California, where I am Director of Clinical Training for our Clinical Science Ph.D program
- I have been studying the transition to parenthood (both in my research and my personal life!) for over 15 years and have published >80 scientific papers
- Today I will discuss stress & resilience in new parents, with a focus on neurobiological changes in fatherhood and downstream effects on offspring

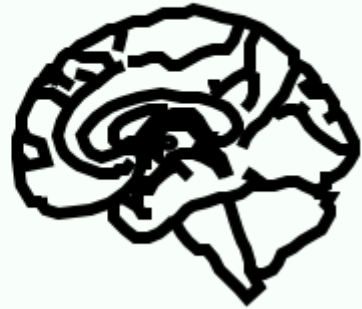


Transition to parenthood: change, opportunity + risk

Domains of
plasticity & change

Domains of health
vulnerability

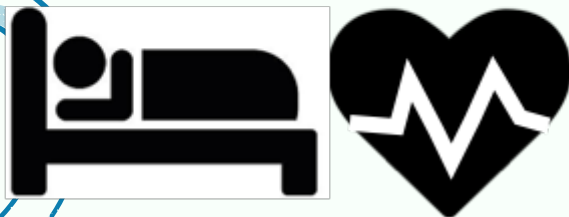
Neurobiological



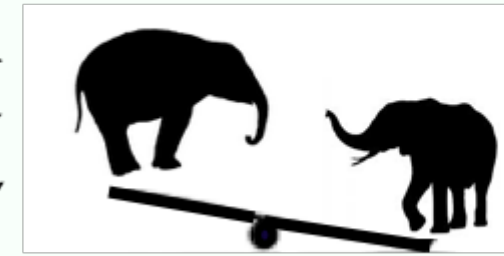
Psychosocial



Behavioral



Allostatic load



Obesity



Mood disorders



Changing brains



- The brain and body are shaped by experience & social environments
- There are “critical windows” for biobehavioral plasticity
 - infancy; adolescence
 - the transition to parenthood?
- Parenting requires investment, new skills
- There is evidence in new moms that the brain gets **SMALLER**



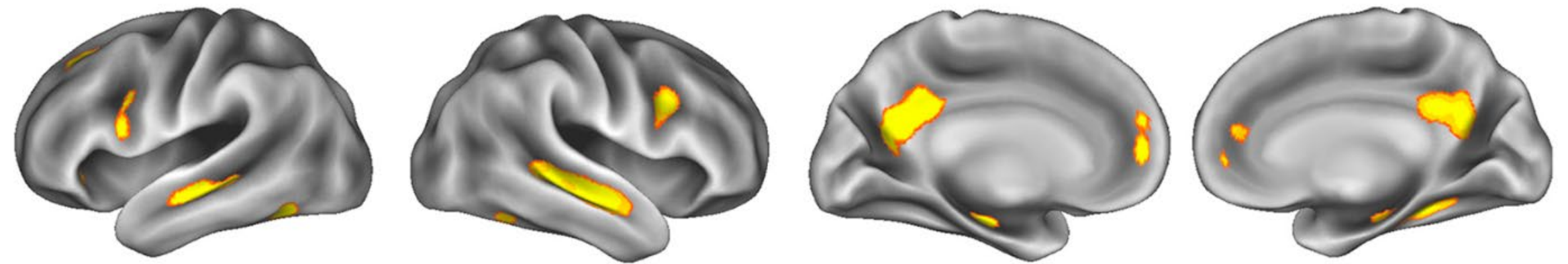
The maternal

Neuromaternal

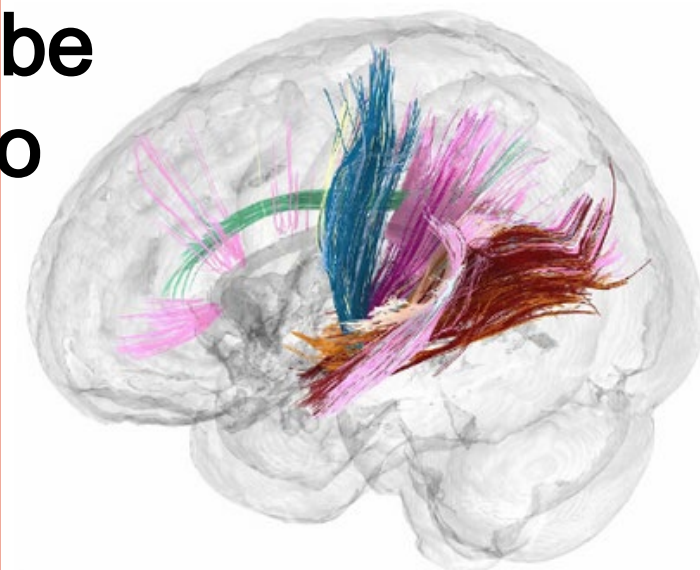
DRA. SUSANA CARMONA



Pregnancy leads to long-lasting changes in human brain structure



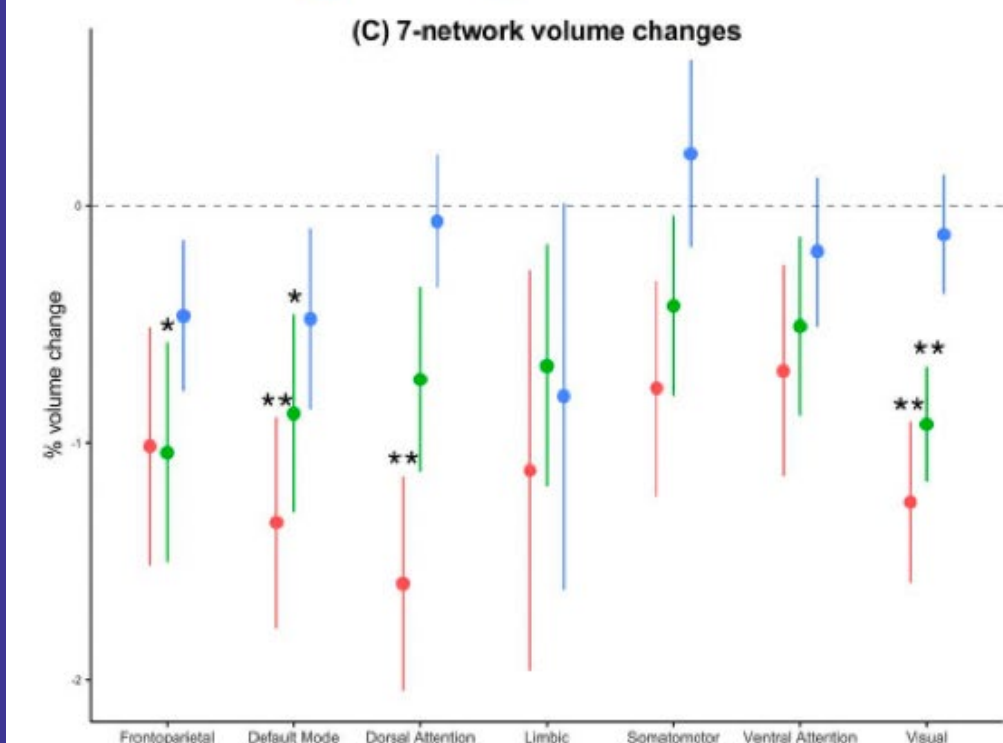
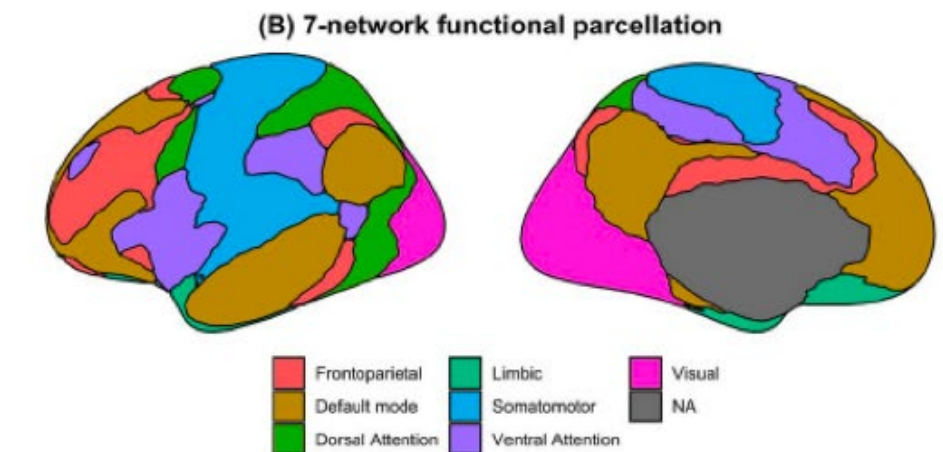
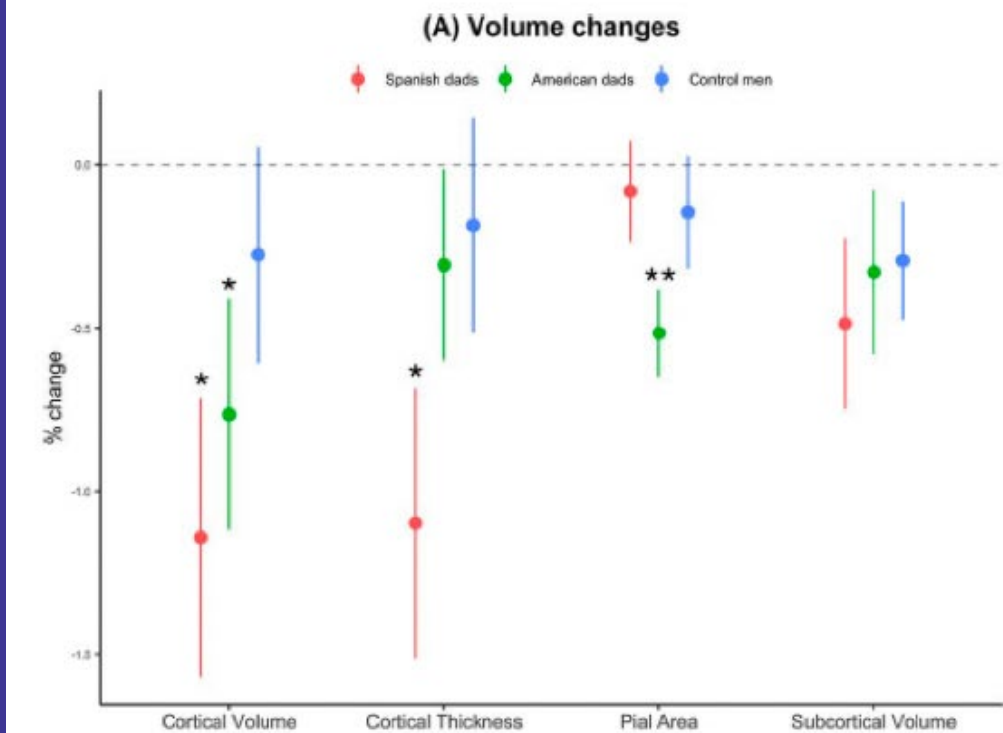
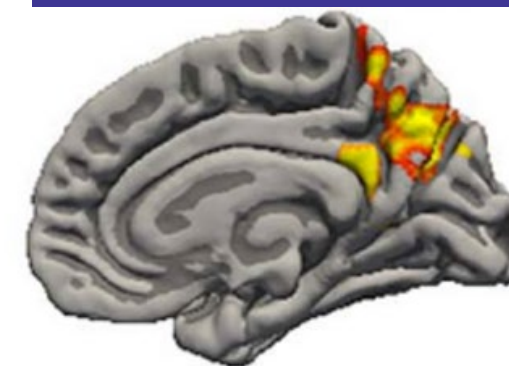
- Among women followed from before pregnancy until after birth, the brain lost volume in regions that are linked with social and emotional processing
- This seems like bad news, but it appears to be adaptive...women who lost more volume also reported stronger bonding with their infants



What about dads?

First-time fathers show longitudinal gray matter cortical volume reductions: evidence from two international samples

Magdalena Martínez-García^{1,2,*}, María Paternina-Die^{1,2}, Sofia I. Cardenas³, Oscar Vilarroya^{4,5}, Manuel Desco^{1,2,6,7}, Susanna Carmona^{1,2}, Darby E. Saxbe³



Dad brain

Becoming a father shrinks your cerebrum



24 13 275

Musk

Don_lyall and @Neuro_Skeptic

ine must be tiny!

1, 2022



What predicts paternal brain change?



- Fathers showed larger grey matter volume reductions from pregnancy to postpartum when they:
 - reported stronger bonding with the infant
 - planned to take time off from work following the birth
 - spent more time with their infants

- However, brain volume decreases were also linked with
 - worse sleep in fathers
 - more mental health problems
 - depression, anxiety, and overall psychological distress — even after controlling for prenatal distress
- These results point to a ‘cost of caregiving’ for men that may echo mothers’ experiences



The left hippocampus

- Part of the brain linked with learning, memory, stress; appears plastic during reproductive transitions in both humans and animals
- Fathers' history of family adversity predicted smaller increases in left hippocampal volume, and prenatal oxytocin levels predicted larger increases in left hippocampal volume.



- Larger increases in left hippocampal volume also predicted:
 - A drop in testosterone from prenatal to six months postpartum
 - Stronger bonding and attachment
 - More effective parenting
 - Lower parenting stress

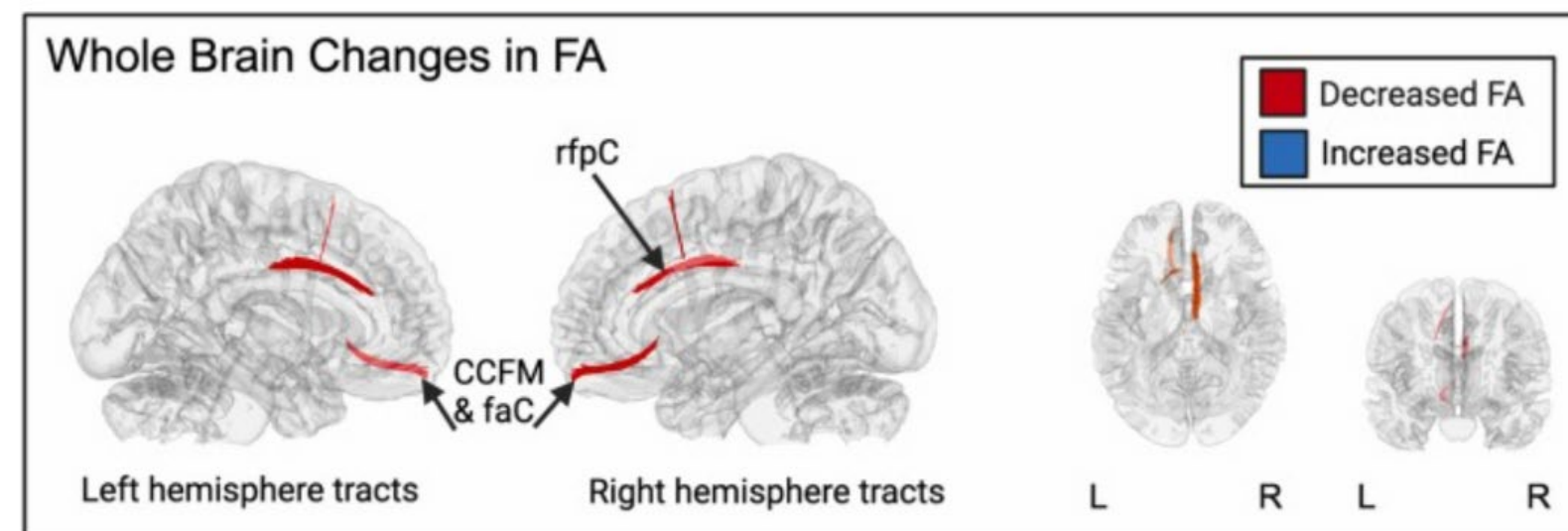


Perinatal white matter change

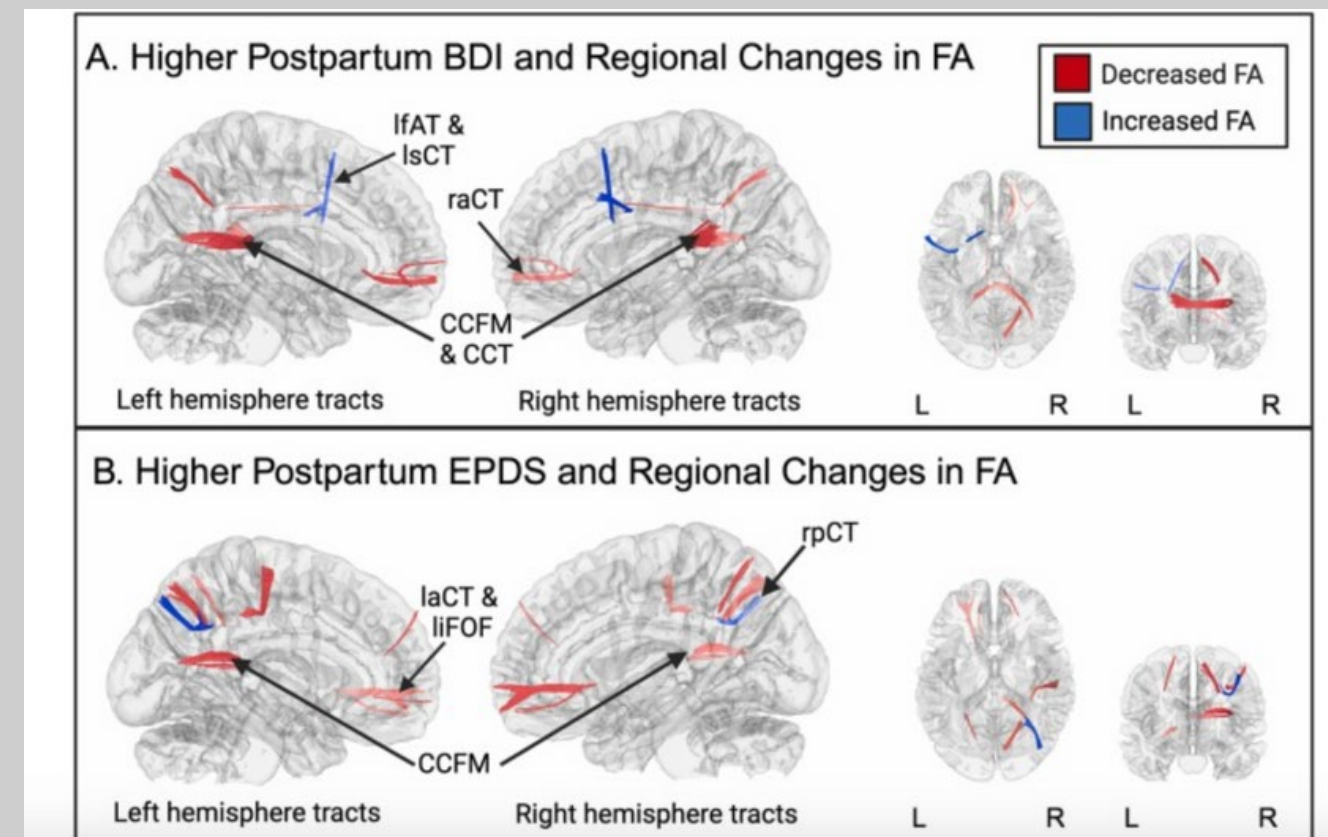
- Overall, fathers showed reduced FA from prenatal to postpartum in the cingulum, corpus callosum, and frontal anterior. ROI analyses found reduced FA in additional corpus callosum tracts & left anterior cortico-striatal tract. Stronger FA decreases in dads whose scans were delayed by COVID

4.4.1. Changes in FA from prenatal to postpartum

Results from Whole Brain. We ran a whole-brain DMRI connectometry model to identify areas with changes in white matter FA from prenatal to postpartum, adjusting for participant's age at the prenatal MRI visit, gestational age of the fetus at the prenatal MRI visit, age of the infant at the postpartum MRI visit, and cohort (Pre-pandemic vs Pandemic). The connectometry analysis identified FA decreases in several tract bundles (FDR = .002, [Fig. 5](#)), including right frontal parietal cingulum, corpus callosum forceps minor, and the frontal anterior commissure. The full list of tract bundles with FA decreases from prenatal to postpartum are listed in the [supplemental materials](#) along with their respective FDRs ([Supplemental Table 3](#)).



- Postpartum depression was associated with FA decreases in corpus callosum tracts, but no associations with parenting stress or perceived stress



Adverse family environments, white matter change, & parenting

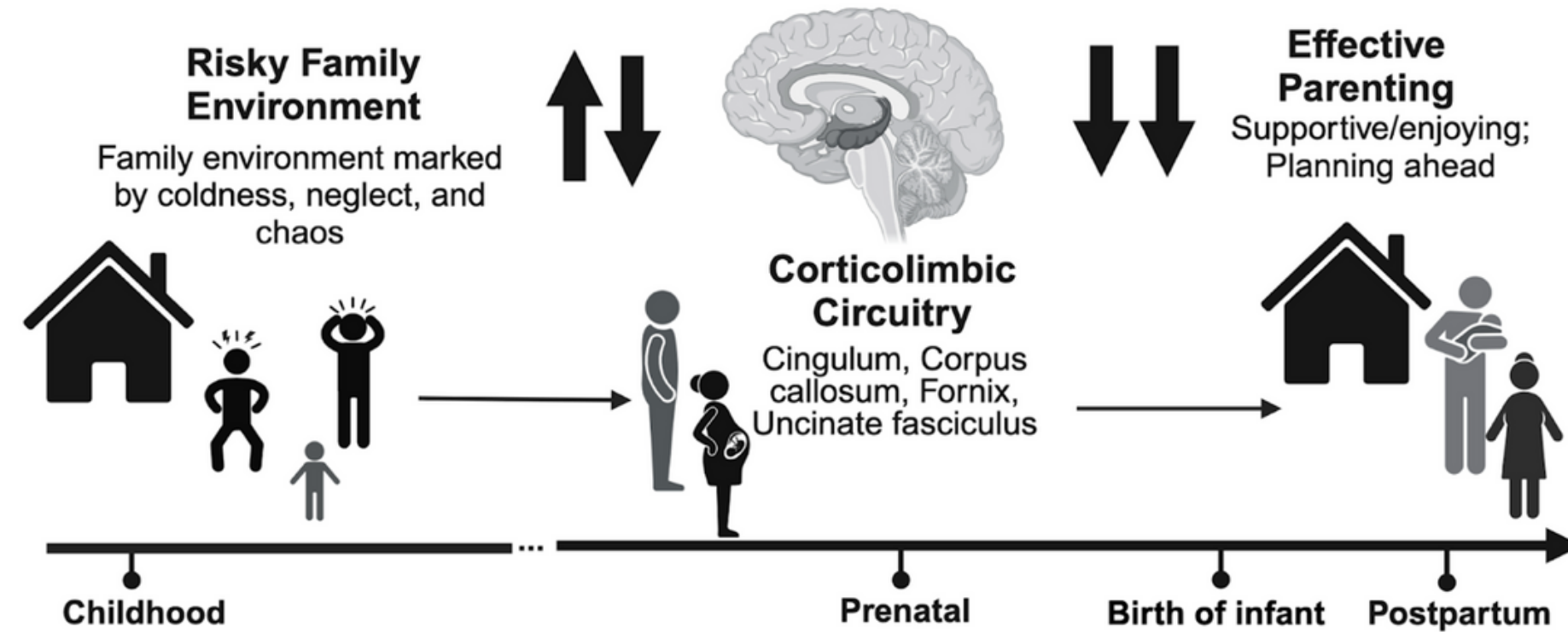
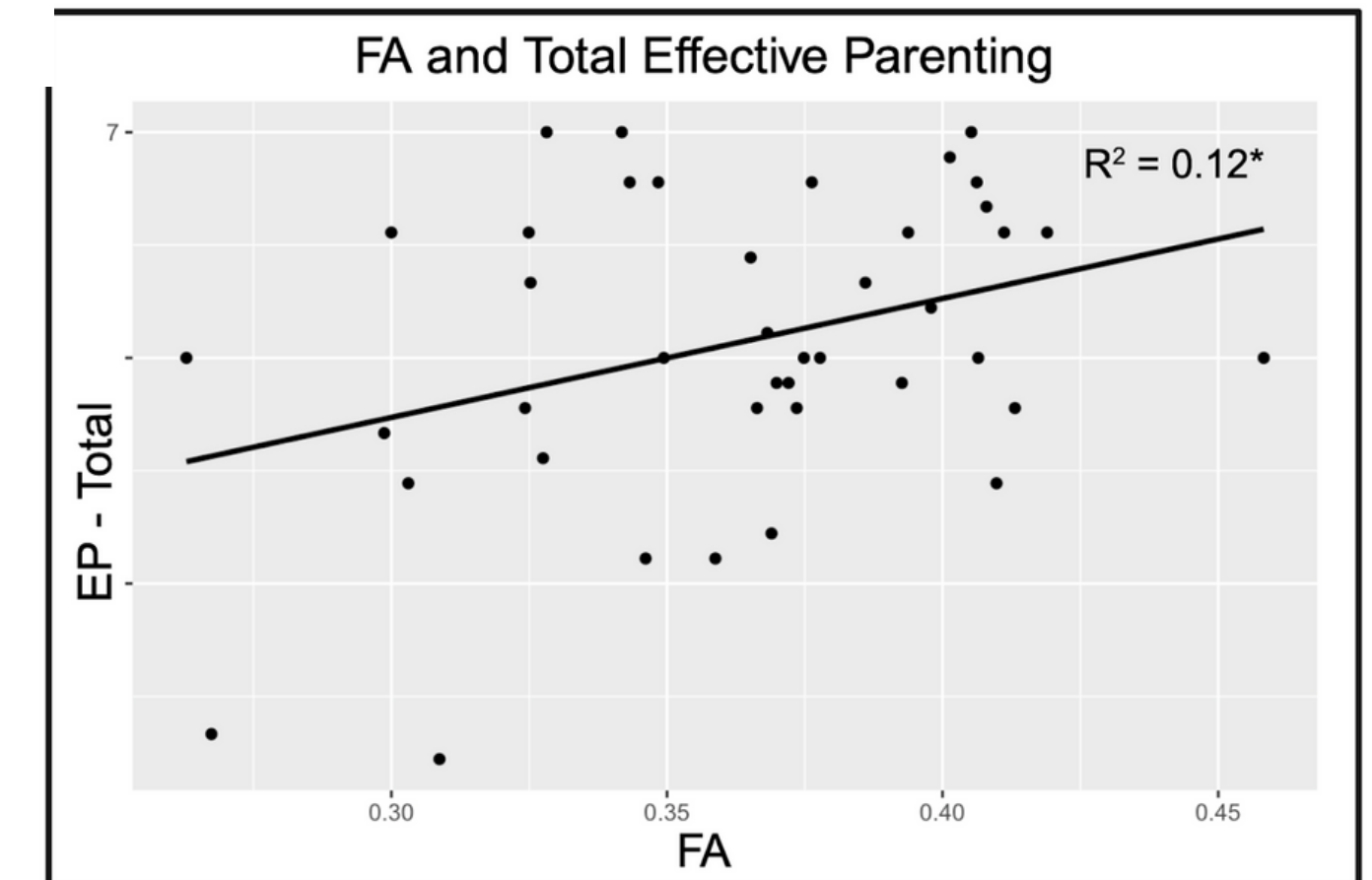
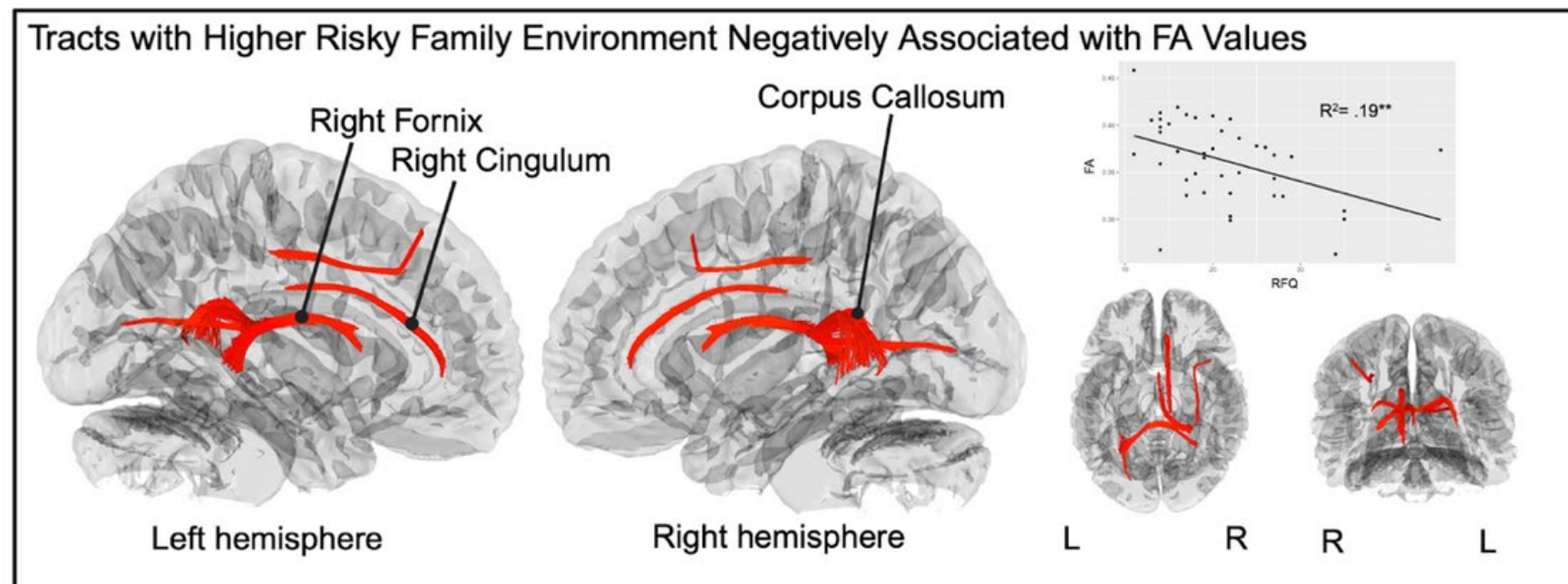


Figure 2. 2. White Matter Tracts Negatively Correlated with Early Risky Family Environments



Father influences on offspring

- Maternal pre -conception & gestational influences on offspring have been documented, but paternal influences also exist and have received less study
- Fathers can influence offspring both directly (e.g. through epigenetic effects) and indirectly (through maternal stress and social support) before birth
- Fathers also exert important postnatal influences on parenting, family functioning

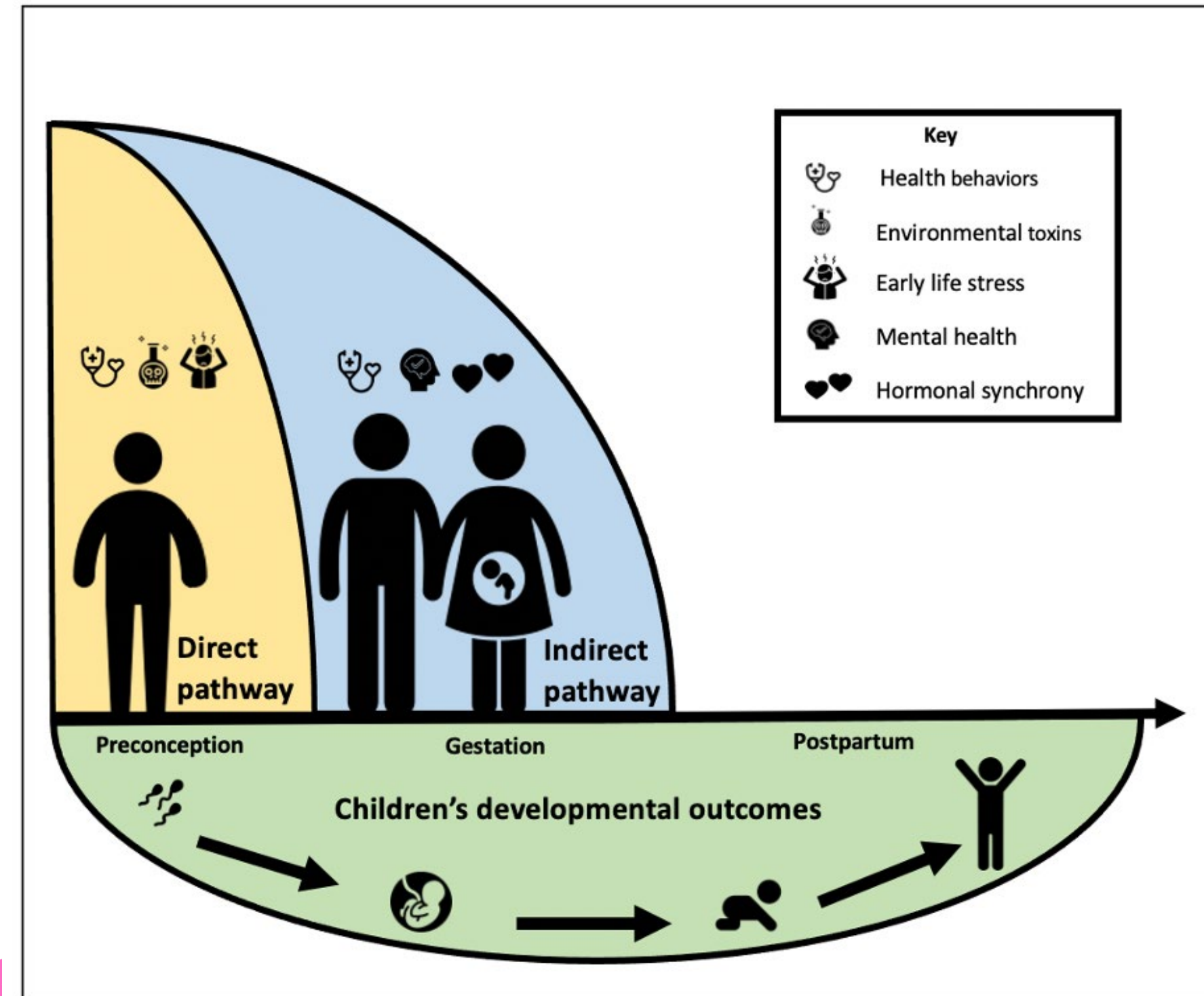
DOI: 10.1111/cdep.12436

ARTICLE

Child Development
Perspectives

Fathers matter from the start: The role of expectant fathers in child development

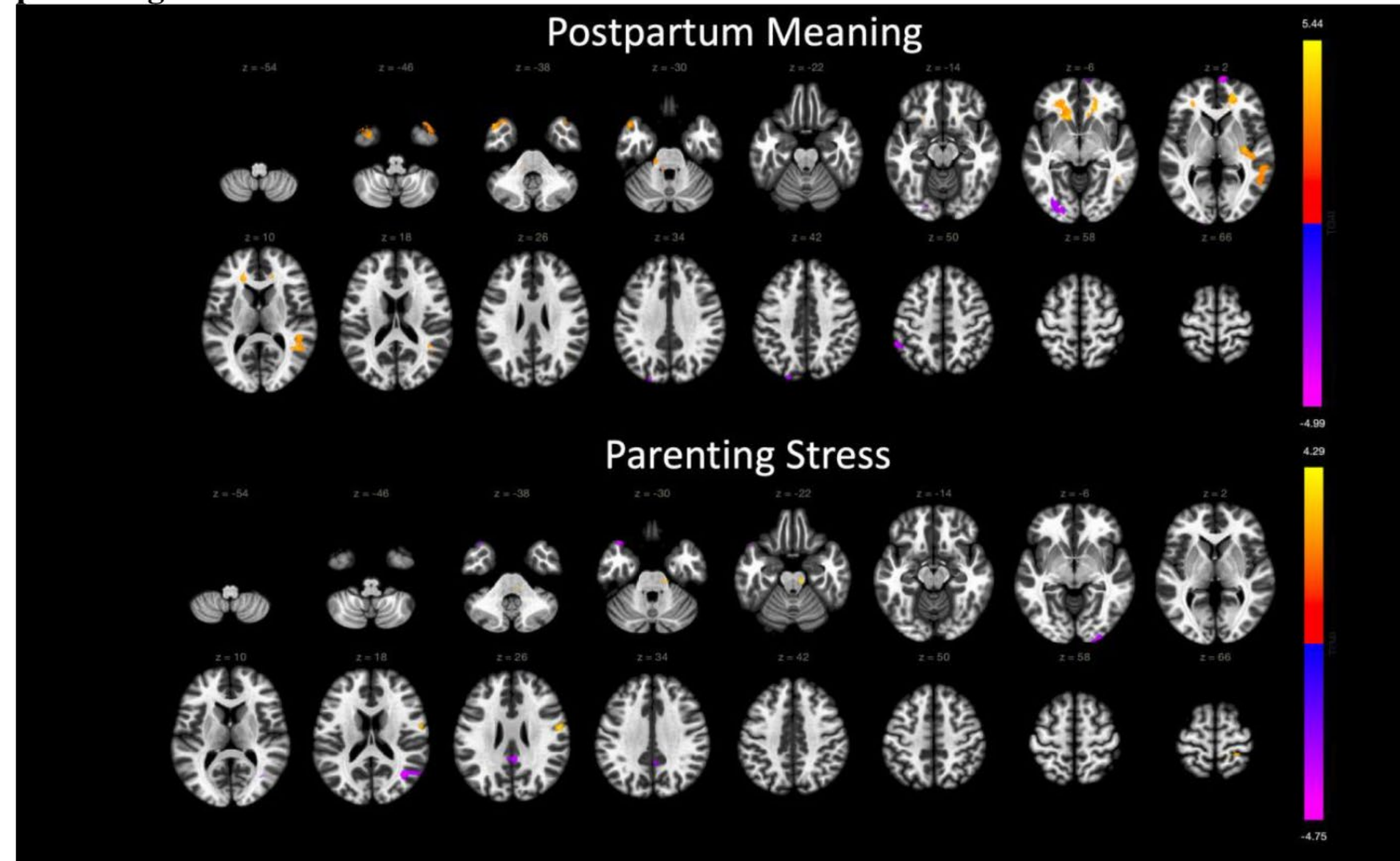
Sofia I. Cardenas¹  | Alyssa R. Morris¹  | Narcis Marshall¹ | Elizabeth C. Aviv¹ |
Magdalena Martínez García^{2,3} | Pia Sellery¹ | Darby E. Saxbe¹



Meaning as a resilience - booster



Figure 2. Intrinsic functional connectivity change associated with postpartum meaning and parenting stress.

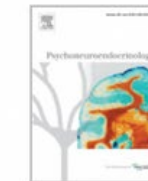


This figure displays positive (orange) and negative (purple) clusters where the change in intrinsic connectivity pre to postpartum predicted postpartum levels of personal meaning and parenting-related stress. Clusters were significant at a voxel threshold of $p < 0.01$ with cluster-size FDR correction at $p < 0.05$.

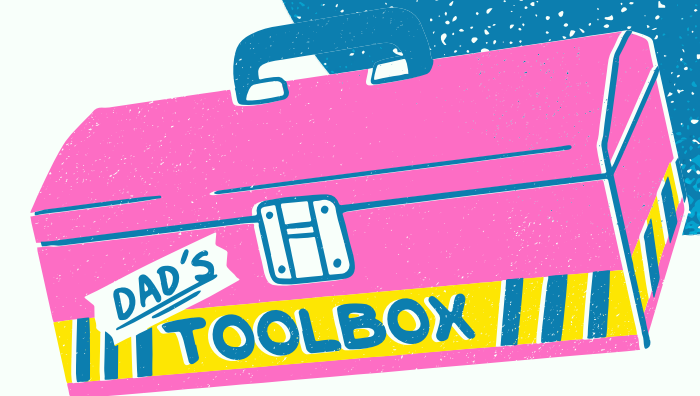
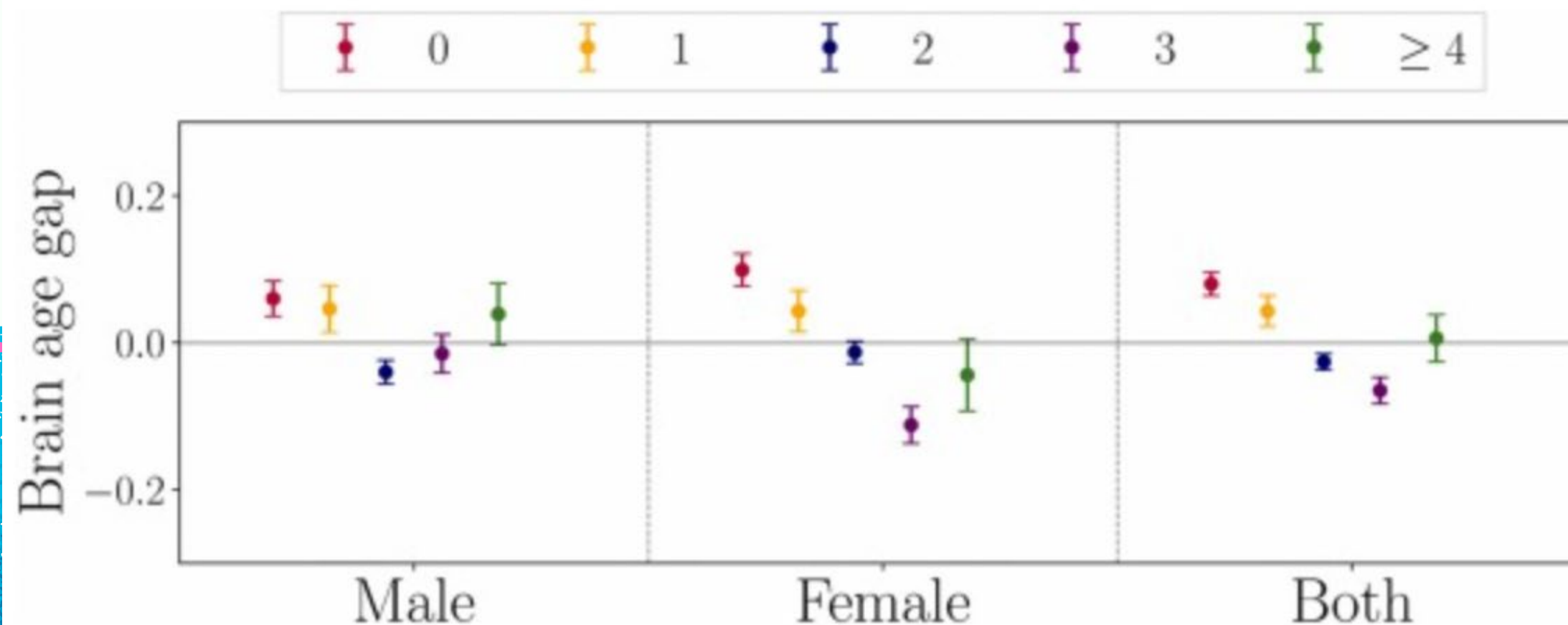
Does parenting keep our brains younger?



Psychoneuroendocrinology
Volume 165, July 2024, 107040

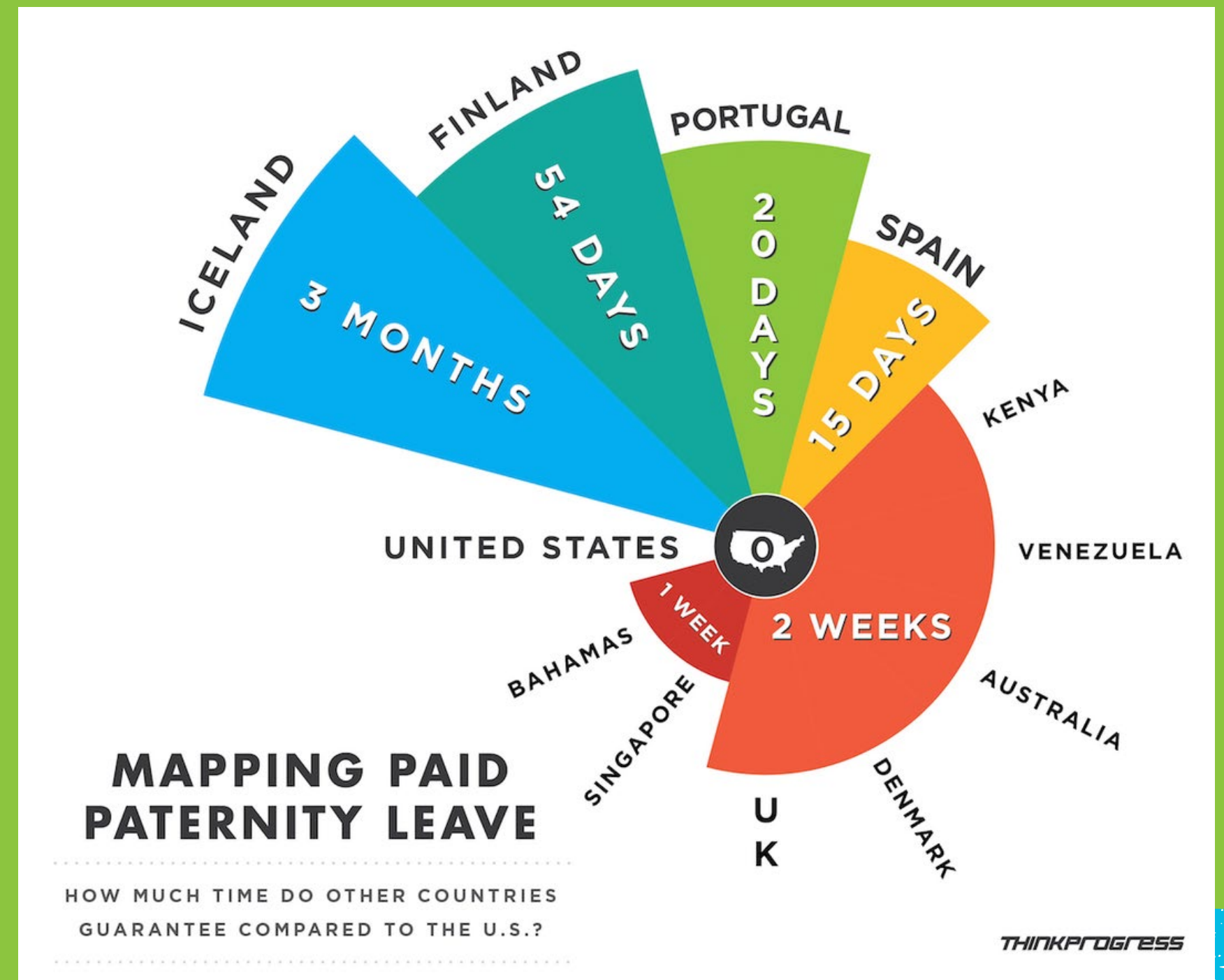


Parental status and markers of brain and cellular age: A 3D convolutional network and classification study



Policy as a resilience - booster?

- Access to paid paternity leave is limited in the United States compared to other countries...but leave (for both mothers and fathers) can help reduce stress and increase time to bond
- Even when dads can access leave, they may be reluctant to take it - we also need culture and workplace change
- Celebrating fatherhood as transformative can help men embrace their new role and see the value of their time spent in fathering



Closing question

- Is the transition to parenthood a “critical window” for health in adulthood?
- It's a time of change in
 - neurobiology
 - psychosocial stress
 - social roles & relationships
 - sleep
 - weight
 - mood disorder risk
 - identity and sense of self
- Changes in these processes may inflect health trajectories & disparities that persist into midlife and beyond, & influence next generation





“Becoming a father does strange
things to a man”



Thanks!



- Funding: NICHD R01, NSF CAREER, NSF Build & Broaden
- NEST Lab at USC, including Gabriella Vavala, Genesis Flores, Sofi Cardenas, Lizzie Aviv, Yael Waizman, Gabe Leon, Anthony Vaccaro & Phil Newsome
- Mentors and collaborators
- Participating families and their infants

