

*The Importance of  
Early Life Experience  
on Lifelong Emotion  
Regulation*

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# *Goal*

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*How do early life experiences affect “emotion regulation” over the lifespan?*

# What forms of *Emotion Regulation* are we interested in?

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- Mental health (*anxiety, depression*)
- Social interactions
- Ability to understand complex emotional interactions
- Ability to attend to cognitive tasks

# Implications of Differences in *Emotion Regulation?*

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- Mood disorders
- Getting along with others and “read” emotional situations
- Emotional control of self
- Ability to learn in school and in life

Studies in developing monkeys  
show lasting effects of experience  
on brain development

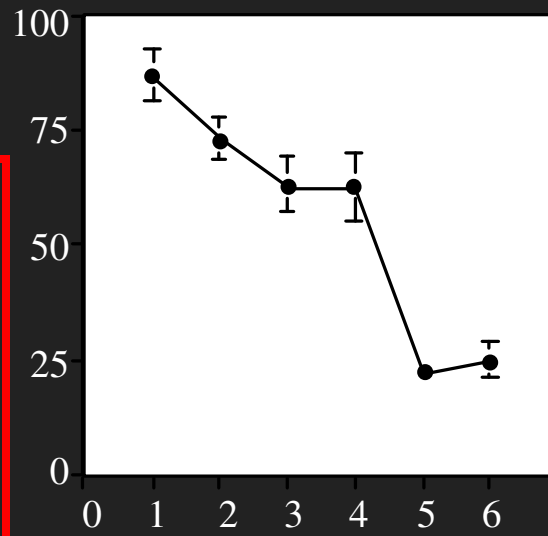
Can *Experiences Early in Life* affect  
emotion regulation?

# *Effects of early life experience on emotion regulation*

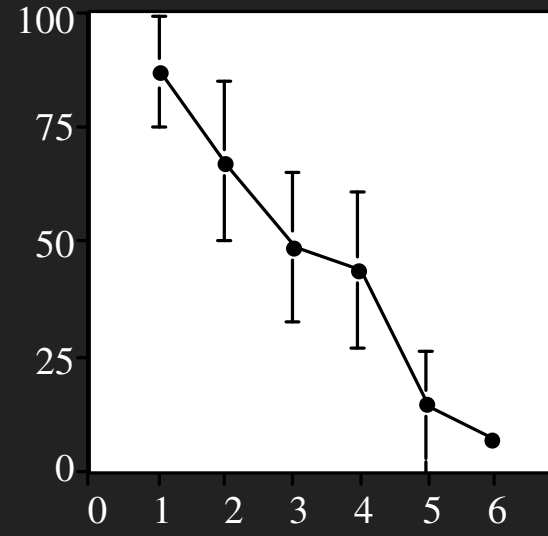
- *Infant monkeys were reared with their mothers in a social group of 4-6 other monkeys.*
- *We studied the early life stress of removing the mother from the social group at either 1 week, 1 month, or 3 months of age.*

Ventral Contact (percent time)

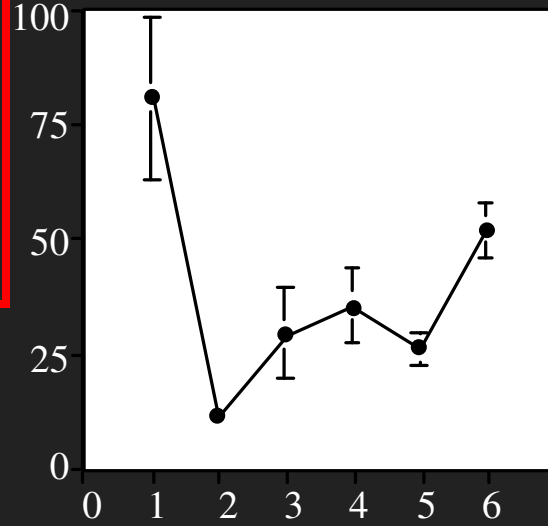
6 month separated



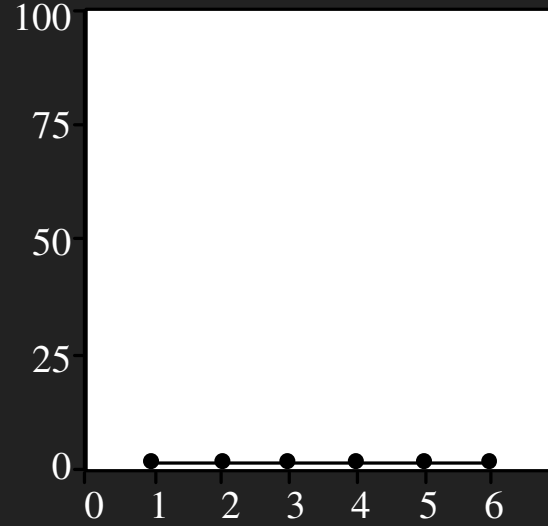
3 month separated



1 month separated



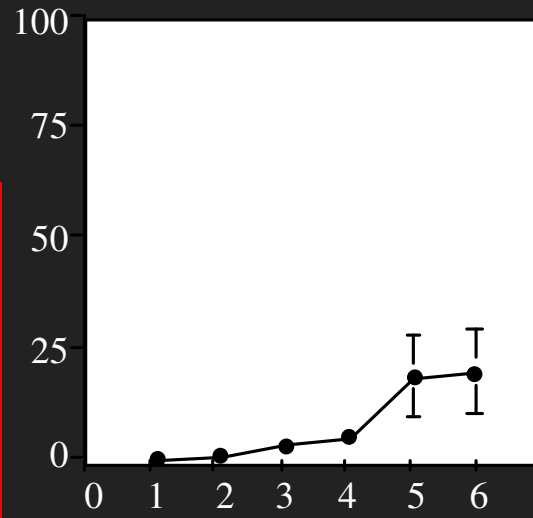
1 week separated



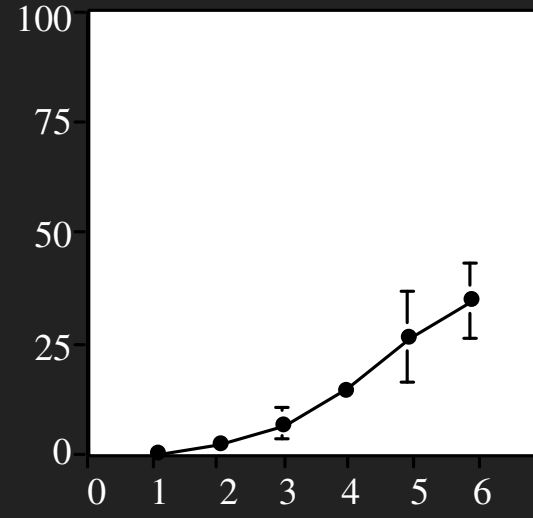
Age (months)

Sit Alone (percent time)

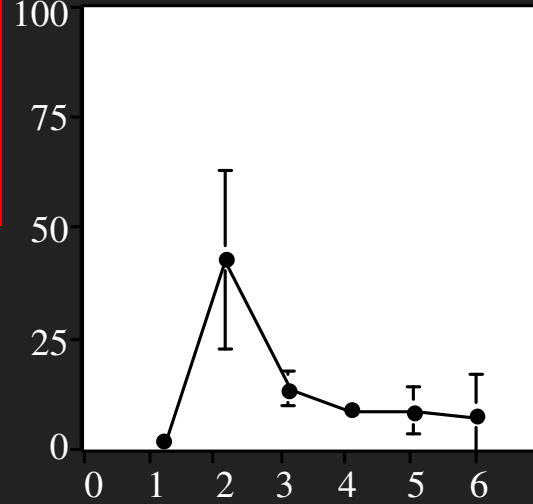
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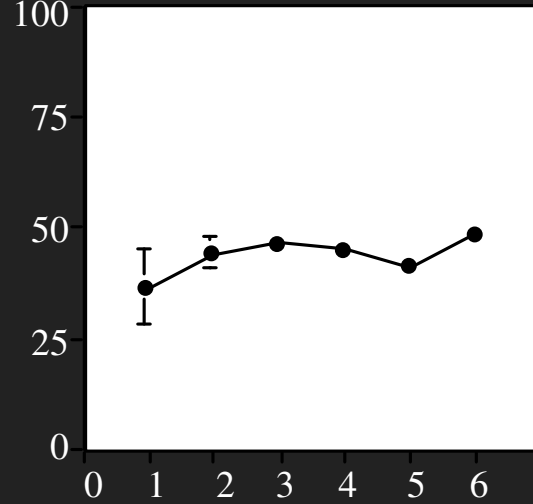
3 month separated



1 month separated



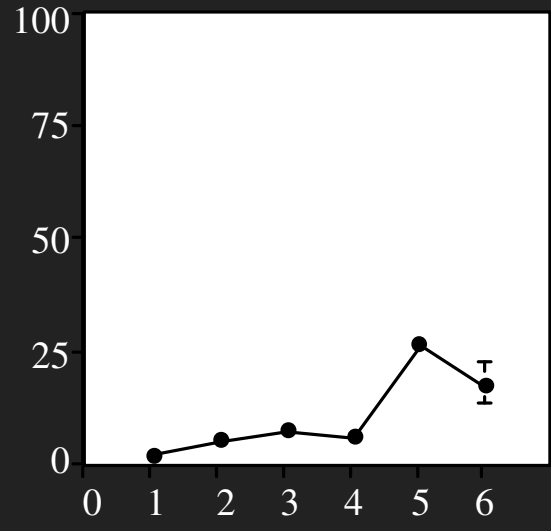
1 week separated



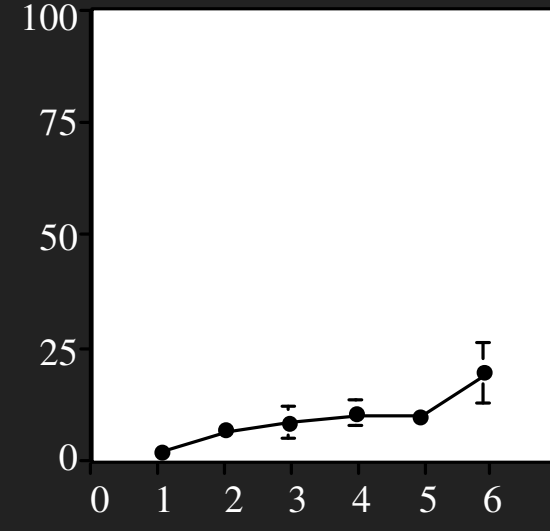
Age (months)

Play/Move (percent time)

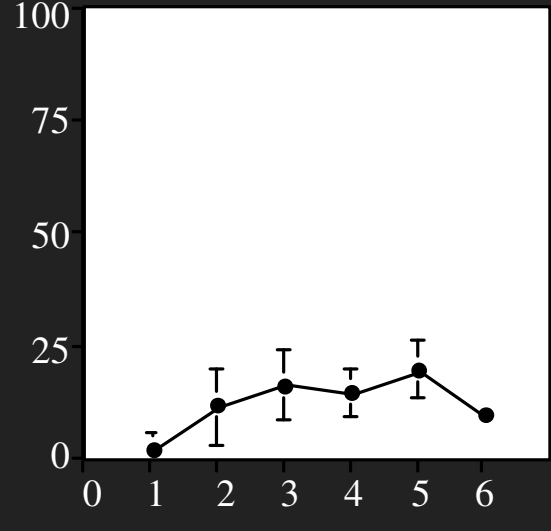
6 month separated



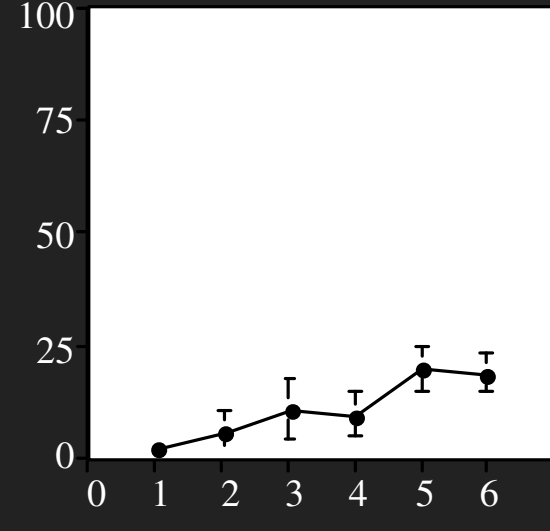
3 month separated



1 month separated

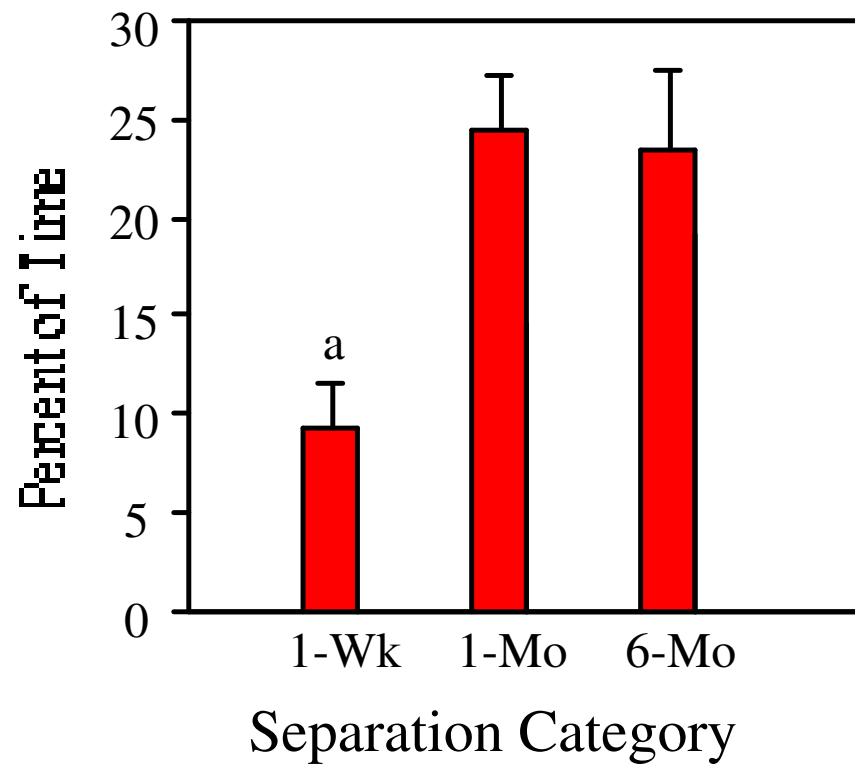


1 week separated

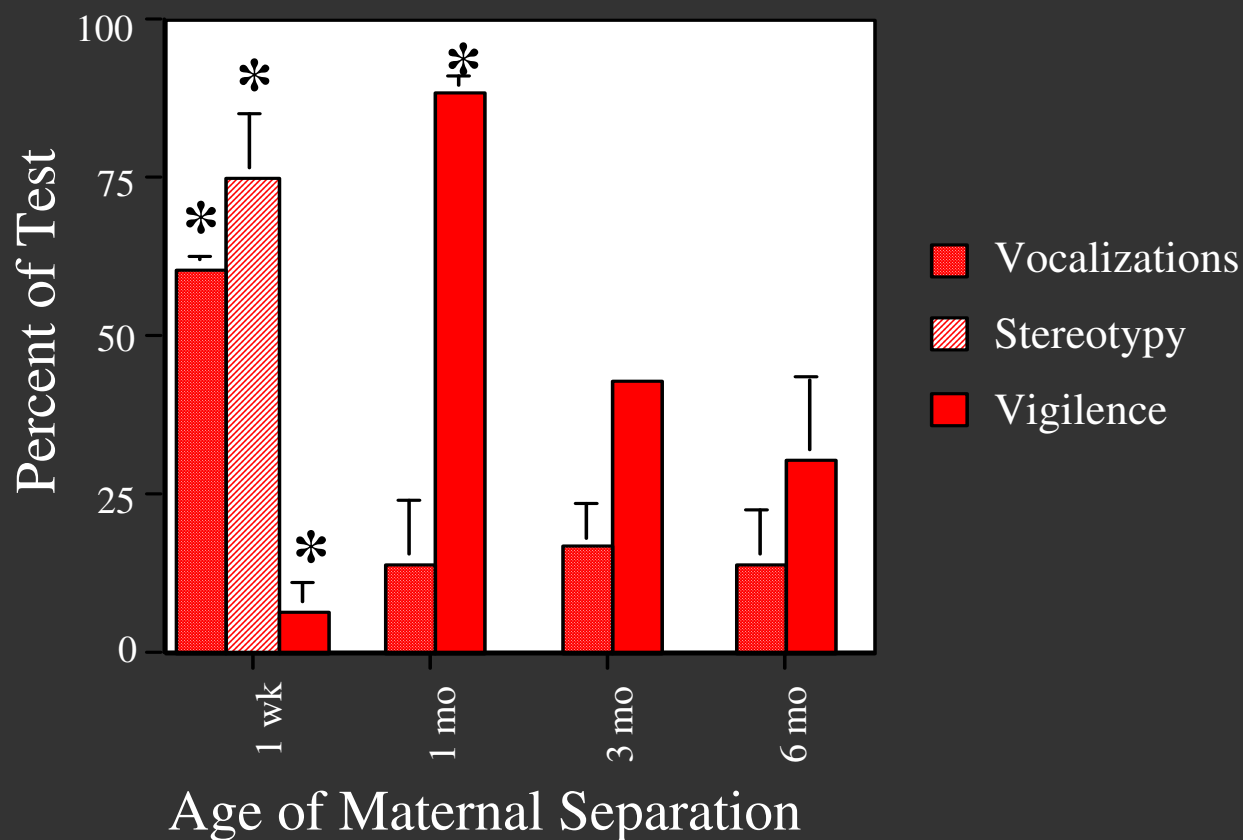


Age (months)

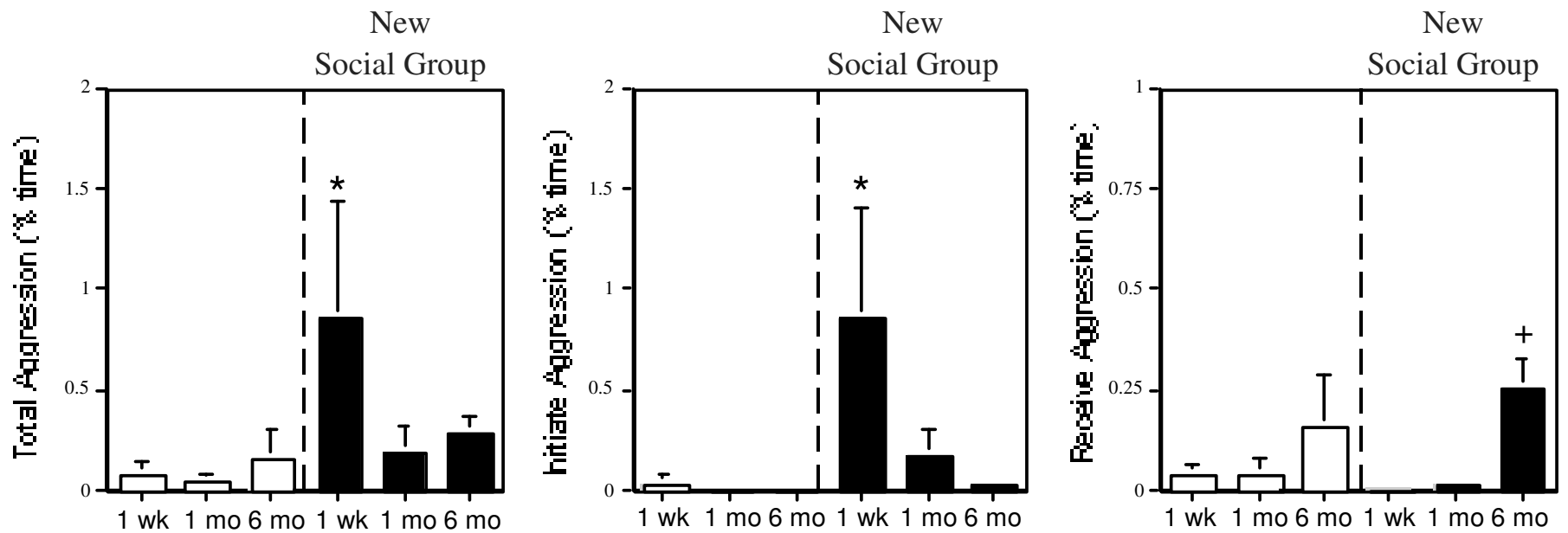
# Social Behavior in Adulthood



# Monkeys Experiencing Early Life Stress Show Increased Anxiety Dependent on the *Timing* Stress Exposure

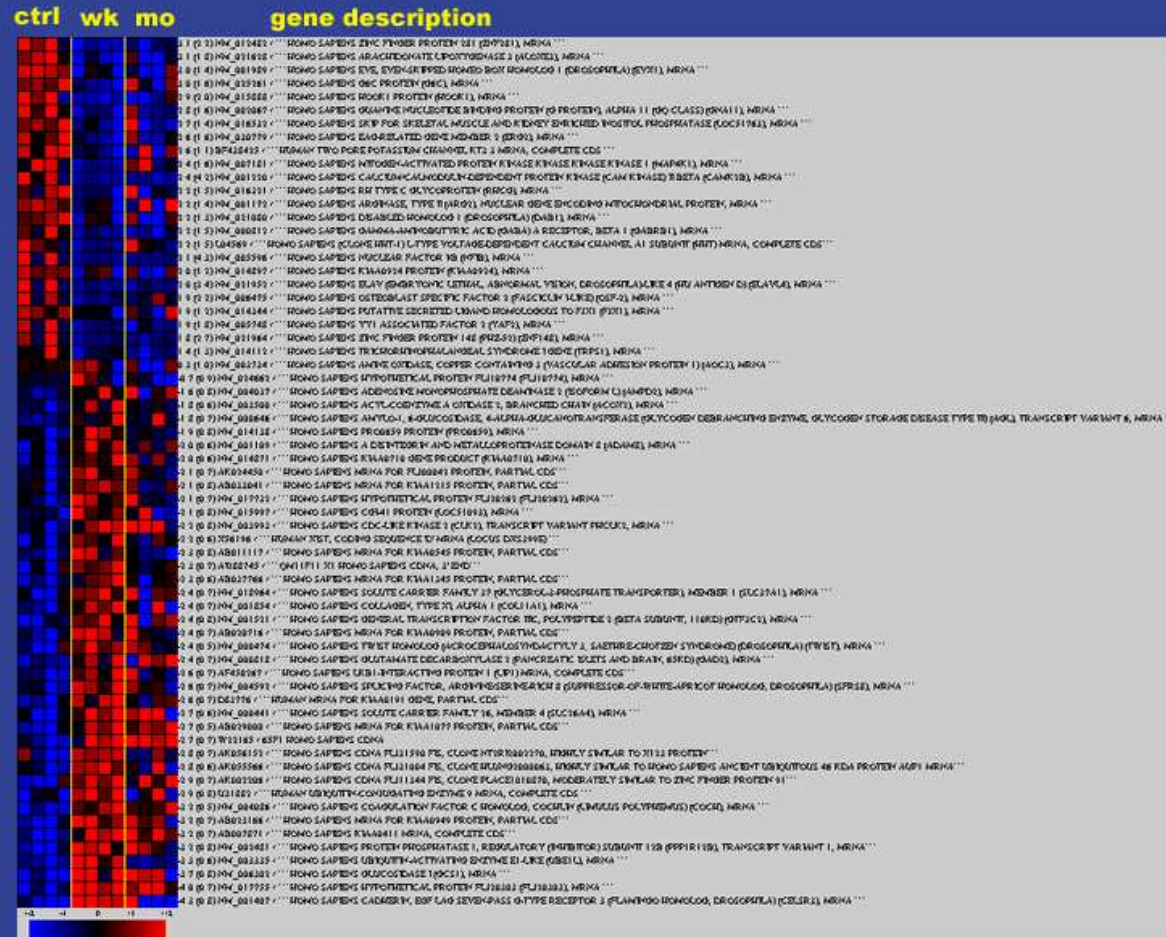


*Early life stress affects adaptation to new social situations, even in adulthood*



*What brain circuits are affected  
by early life social bond  
disruption?*

# Early Life Experience Changes Gene Expression in the Brain



# Early Social Disruption in Monkeys has *Long-lasting* Effects

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- Monkeys experiencing social bond disruption at *one week of age* are:
  - *less socially aware and socially involved*
  - *show a dramatic increase in anxious behaviors*
  - *have difficulty with social interactions and are more prone to aggression*
- Monkeys experiencing social bond disruption at one month of age are:
  - *more socially vigilant*
  - *show some increase in anxious behaviors*

# *Intervention*

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- *Can pairing a separated infant with a very attentive adult reverse the effects of early social bond disruption?*
- *Does the **timing** of therapy matter?*

# *Intervention Design*

Mother  
Removed

Paired with  
Experienced  
Mother



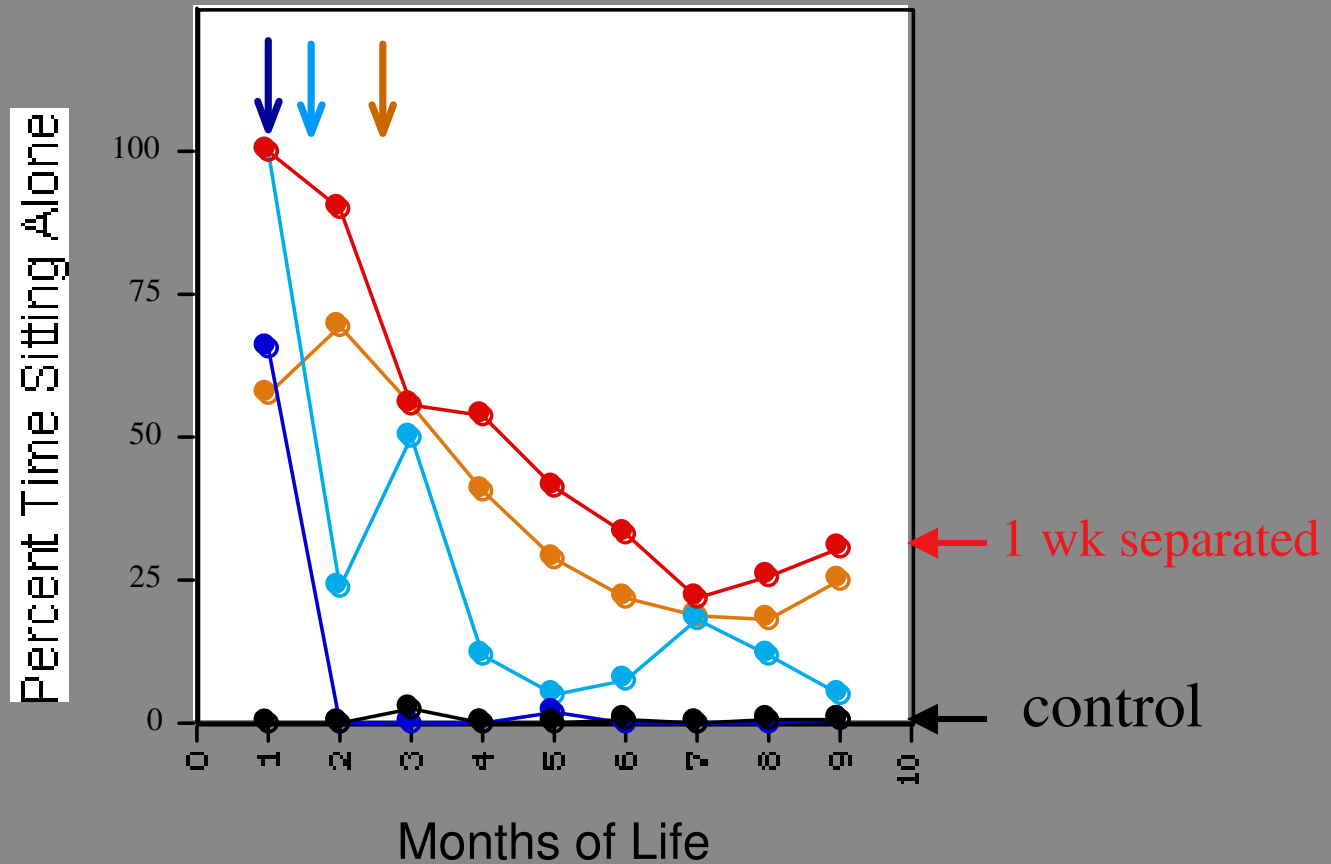
1 wk

...1-3 months

Behavioral Assessments



(arrows show introduction of experienced mother)



*Pairing with an experienced mother is **only** effective when initiated early.*

## What are the Policy Implications?

- *Experiences that lead to dramatic social bond disruption early in life can have life long impact on social competence, mental health, and self regulation.*
- *The brain is sensitive to these experiences at a very early age.*
- *Intervention can be effective and prevent long-term consequences of early social bond disruption, but it must be initiated very early.*

## *Futher Studies Needed*

- Better definition of effects of early life stress on functional outcomes (social learning, parenting behavior, ability to cope in stressful situations).
- Brain systems (genes) affected by early life stress at different ages.
- Better definition of effective therapeutic strategies.

# References

- Sabatini, M.J., P. Ebert, D.L. Lewis, P. Levitt, J.L. Cameron, and K. Mirnics. Amygdala gene expression correlates of social behavior in monkeys experiencing maternal separation. *J. Neuroscience* 27: 3295-3304, 2007.
- Knudsen, E.I., J.J. Heckman, J.L. Cameron and J.P. Shonkoff. Building America's Future Workforce: Economic, Neurobiological and Behavioral Perspectives on Investment in Human Skill Development. *Proceedings of National Academy of Science* 103: 10155-10162, 2006.
- Nelson, C.A., F.E. Bloom, J.L. Cameron, D. Amaral, R. Dahl, and D. Pine. An integrative, multidisciplinary approach to the study of brain-behavior relations in the context of typical and atypical development. *Developmental Psychopathology* 14: 499-520, 2002.