

How Addiction impacts the Parenting Relationship

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Main take home messages from today

1. Maternal addiction remains a public health concern and has implications for women, their children, and the broader family system
 - We need to recognize the unique role of women as mothers
2. We are learning more regarding the neurobiological systems that support parenting and are affected by addiction
 - This allows for the identification of mechanisms that lend themselves to novel intervention approaches

How concerned should we be regarding maternal substance use? Orienting points



- Maternal = prenatal and postpartum
- Substance use = licit and illicit substances, poly-usage, an addictive process
- The unique demands of being a mother (or a parent even)

In 2012-2013 (SAMHSA):

- 5.4% of pregnant women using substances during pregnancy
- Increasing age associated with decreasing substance use during pregnancy
- Less substance use in third trimester as compared to first and second trimesters
- 9.4% of pregnant women are drinking alcohol and 15.4% report past month tobacco smoking

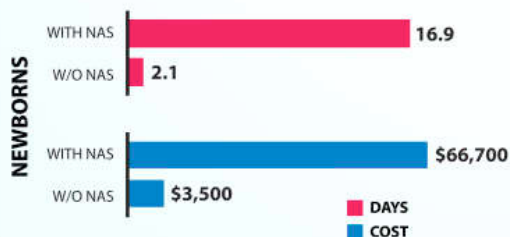
DRAMATIC INCREASES IN MATERNAL OPIOID USE AND NEONATAL ABSTINENCE SYNDROME

THE USE OF OPIOIDS DURING PREGNANCY CAN RESULT IN A DRUG WITHDRAWAL SYNDROME IN NEWBORNS CALLED **NEONATAL ABSTINENCE SYNDROME (NAS)**, WHICH CAUSES **LENGTHY** AND **COSTLY** HOSPITAL STAYS. ACCORDING TO A NEW STUDY, AN ESTIMATED **21,732 BABIES** WERE BORN WITH THIS SYNDROME IN THE UNITED STATES IN 2012, A **5-FOLD INCREASE** SINCE 2000.

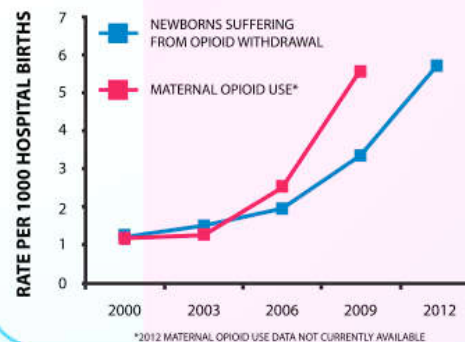


EVERY 25 MINUTES, A BABY IS BORN SUFFERING FROM OPIOID WITHDRAWAL.

AVERAGE LENGTH OR COST OF HOSPITAL STAY



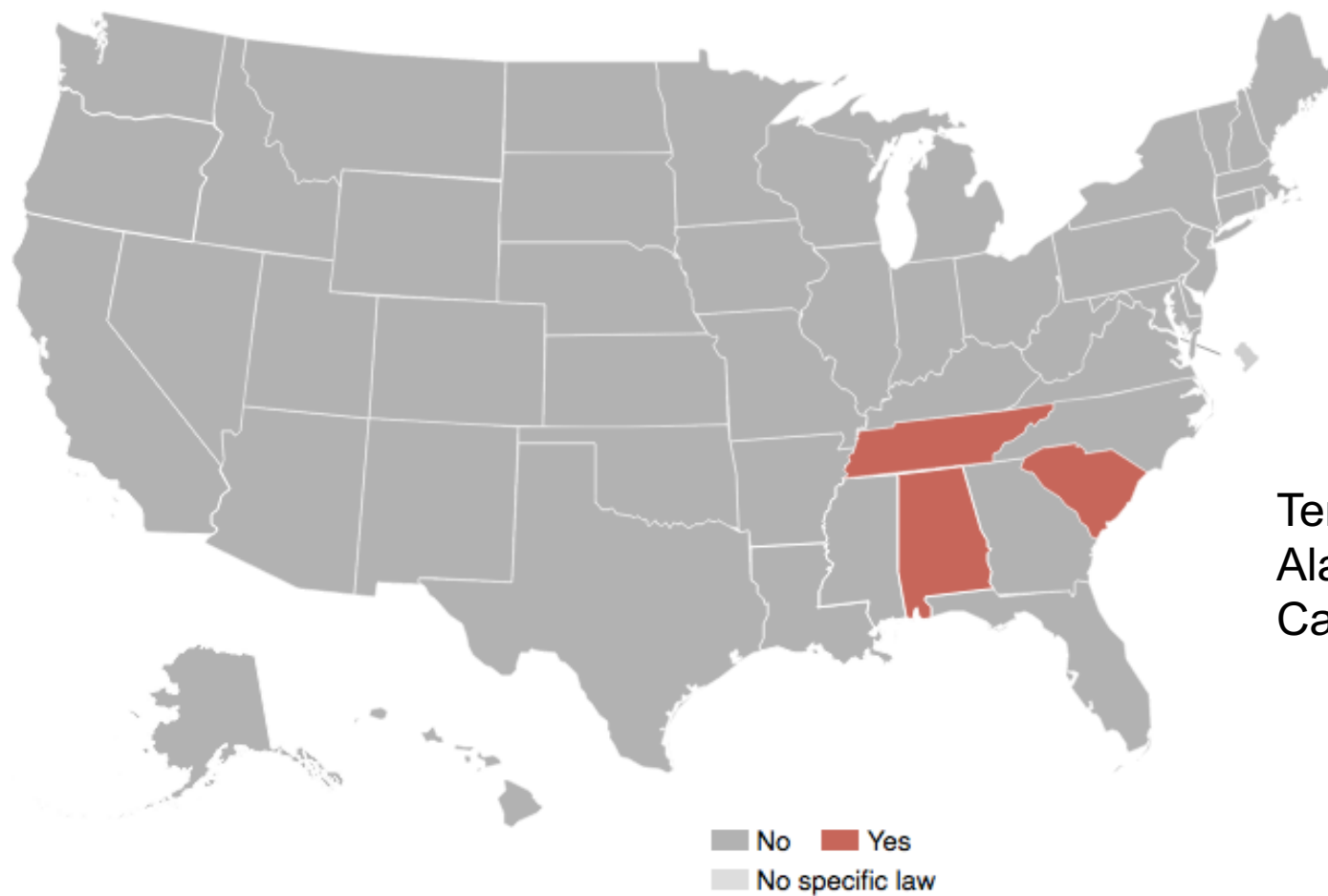
NAS AND MATERNAL OPIOID USE ON THE RISE



Forray et al (2015):

- Examined abstinence and relapse of cigarettes, alcohol, marijuana, and cocaine use
- 83% of women achieved abstinence in pregnancy.
- 80% of women relapsed in the 2 years after delivery.
- Abstinence was more likely for alcohol, marijuana and cocaine than cigarettes.

Legal consequences of prenatal substance use?

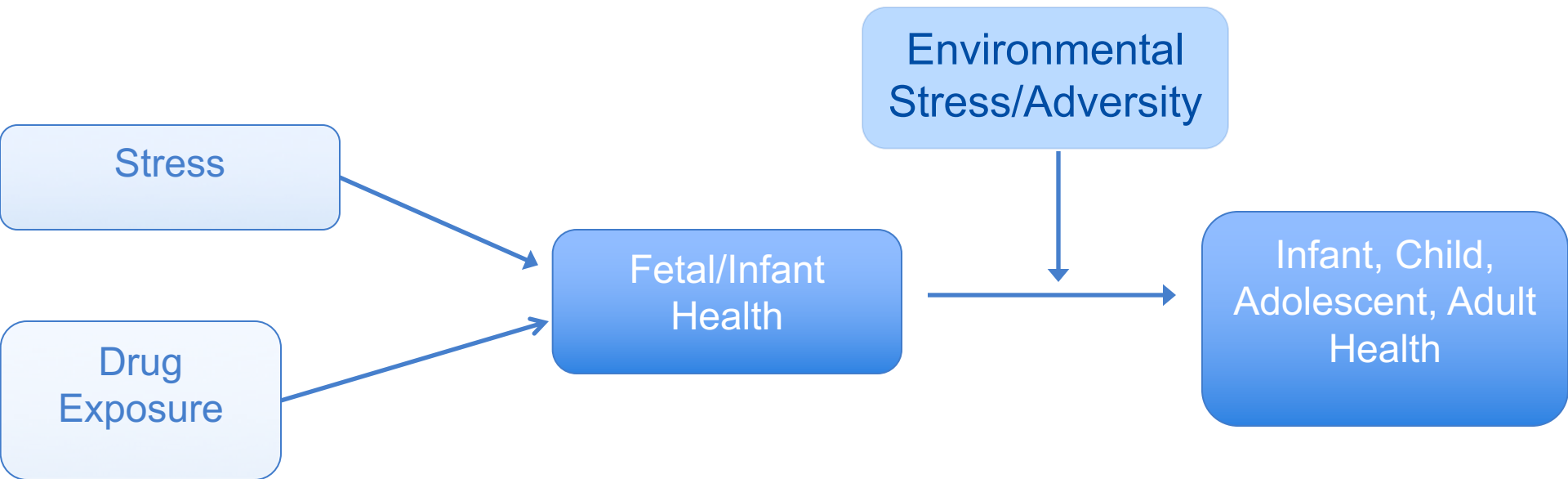


Tennessee*,
Alabama and South
Carolina

Teratogenic effects of substance use

- Substance use (broadly defined) associated with: miscarriage, stillbirth, low birthweight, prematurity, physical malformations and neurological damage (WHO, 2016)
- Behavioral, cognitive, and affective disruptions unclear
 - Findings conflict, especially with increasing age of cohorts
 - Other “co-morbid” associations including parental psychopathology (e.g., depression, anxiety, PTSD, substance use disorder) and lifestyle factors (e.g., poor nutrition, access to services, decreased social support)
 - Continued active drug exposure postnatally
- Parental substance abuse “marker” for extreme increase in perinatal and postnatal stressors / adversity
 - Infants and young children exposed also to adverse environments postnatally with impact on similar neural systems

An Interactive Model



Postpartum Maternal Behavior

- Accumulating observational studies that evidence quality of parenting may be compromised in addiction (though null reports too)
 - Imbalance between mothers being **too intrusive and overcontrolling** in their interactions vs. **too disengaged**



Maternal Substance Use

- Increased rates of:
 - Child maltreatment (including neglect and abuse)
 - Removal of a child from a family
 - Two-thirds of child maltreatment fatalities
- Developmental pathways to addiction based on early childhood experiences



(Cash & Wilke, 2003; Mayes & Suchman, 2006;
Reid, Macchetto, & Foster, 1999;
US Department of Health and Human Services, 1999)

Addiction and the addictive process

- Addiction represents the dysregulation between reward and stress neural circuitries
- Transition from positive reinforcement to negative reinforcement:
 - Initial reward of substance use
 - Continued drug use to relieve the negative affective state of abstinence, leads to habitual use
- Reward system is “co-opted” to maintain habitual behavior associated with relief of negative affect and stress

(Koob & LeMoal, 2001; Koob & Volkow, 2009)

Addiction and implications for parenting

- Co-optation of reward system may result in other rewards not being as salient
- These rewards may include social affiliation and relationships
- Feelings of stress in caregiving role may increase craving and substance use seeking behavior

Addiction and implications for parenting

- Underlying hypothesis for our research approach:
 - Substance using parents may find caring for an infant less rewarding and more stressful
- A reward-stress dysregulation model of addiction and parenting

(Rutherford et al., 2011; Rutherford, Potenza, & Mayes, 2013, Rutherford & Mayes, in press)

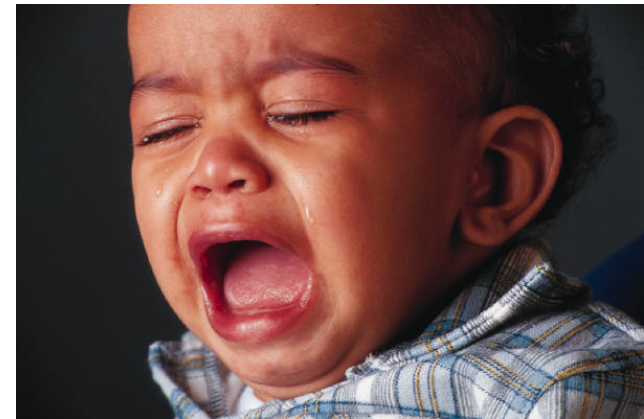
Two critical pieces of parenting and addiction



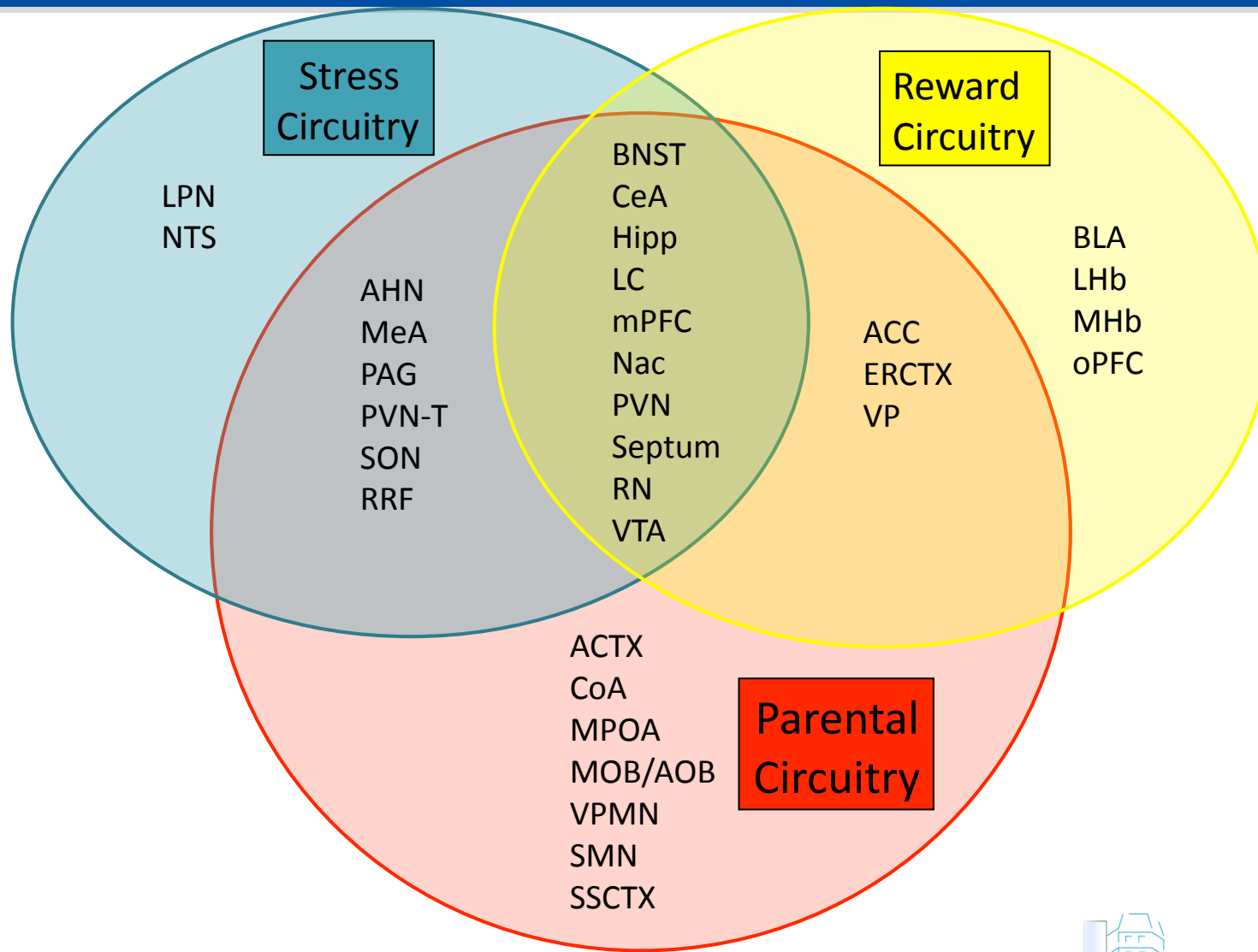
Reward

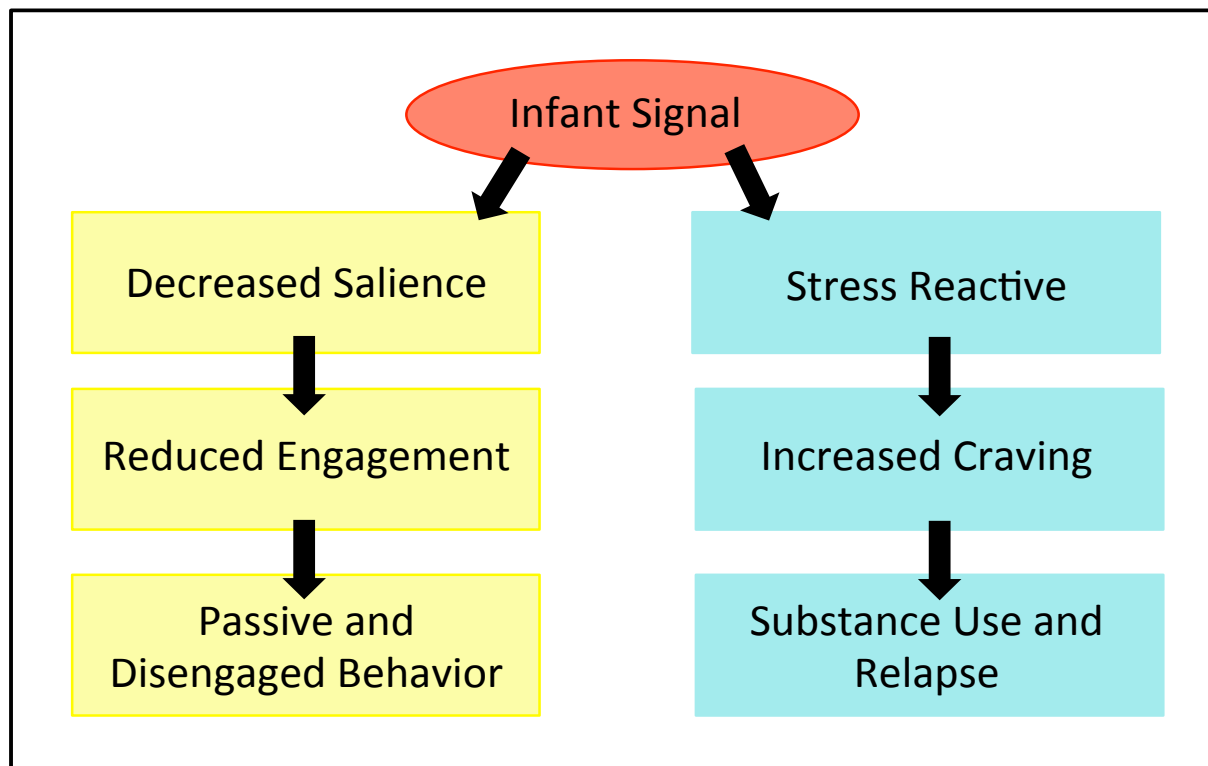


Stress



A reward-stress dysregulation model of addiction and parenting







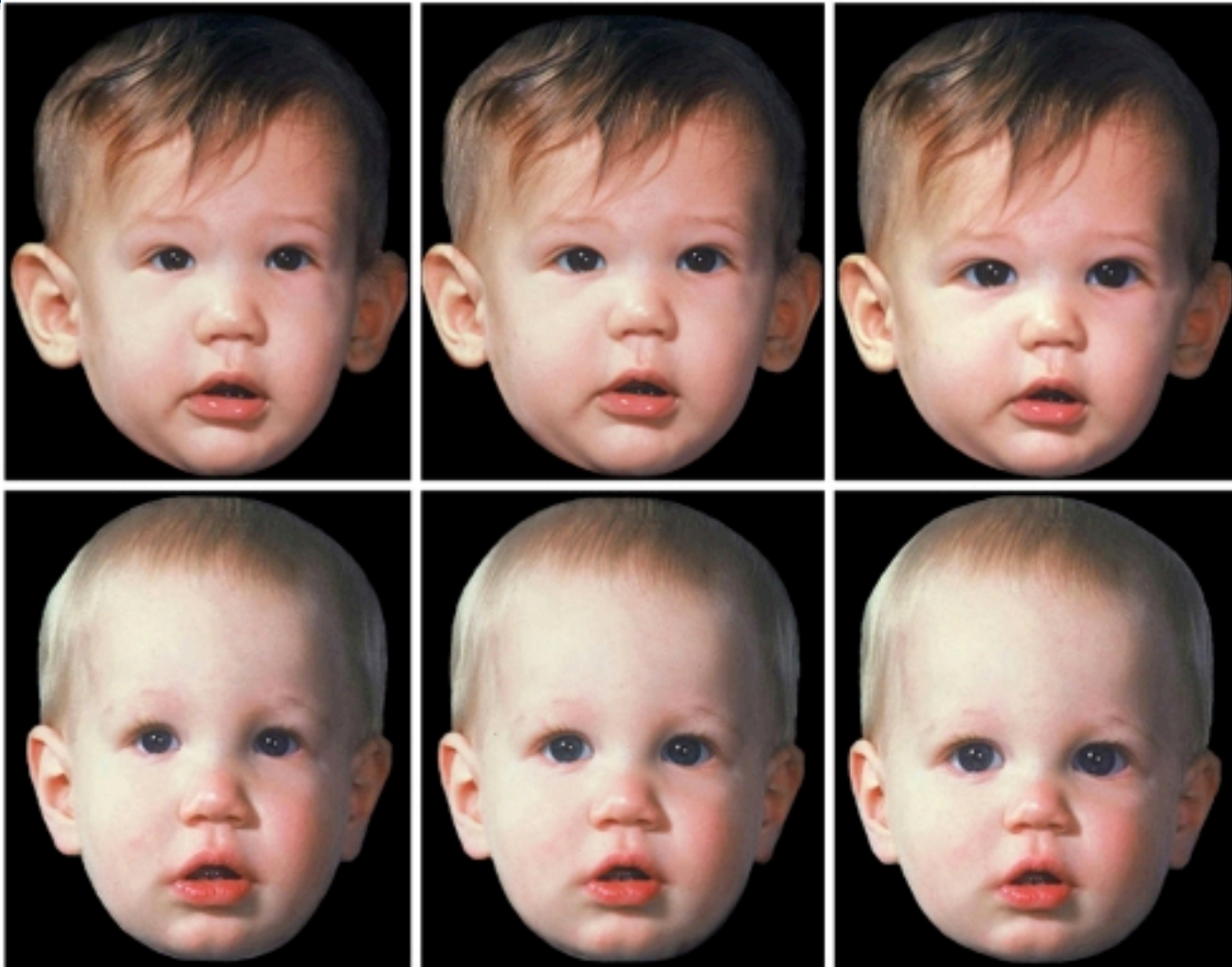
Reward and Addiction

The attractiveness of infant faces

- Evolutionarily, survival of human infants depends on nourishment from parents
- Key features of infants make them more attractive (Lorenz, 1935; 1943)



Infant Faces are Rewarding and Cute

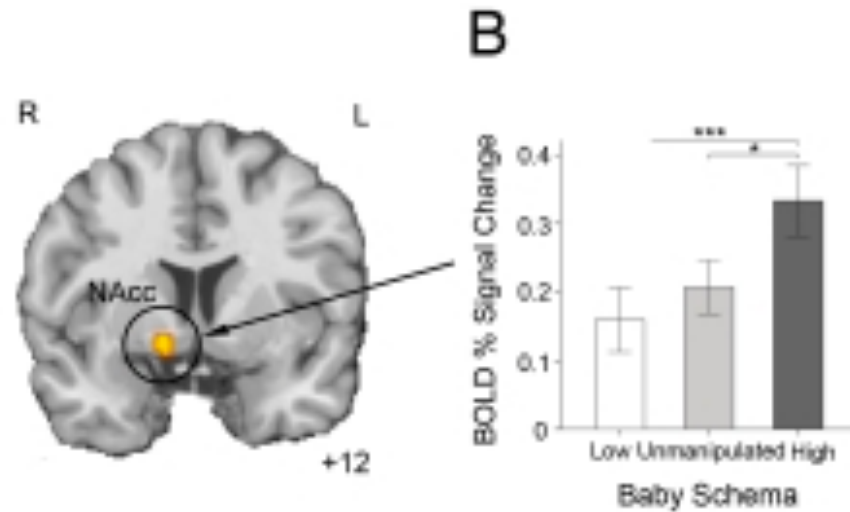
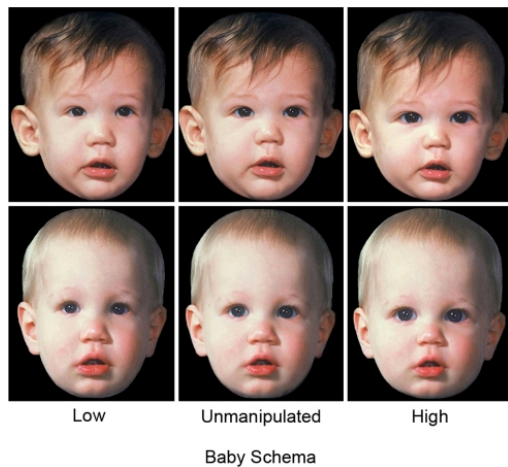


Low

Unmanipulated

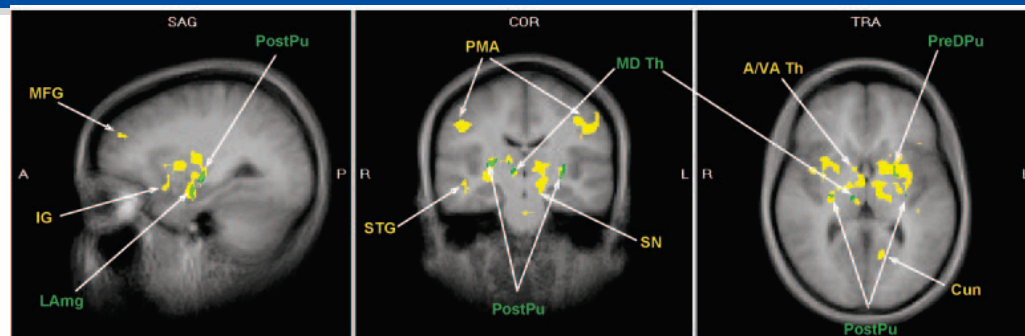
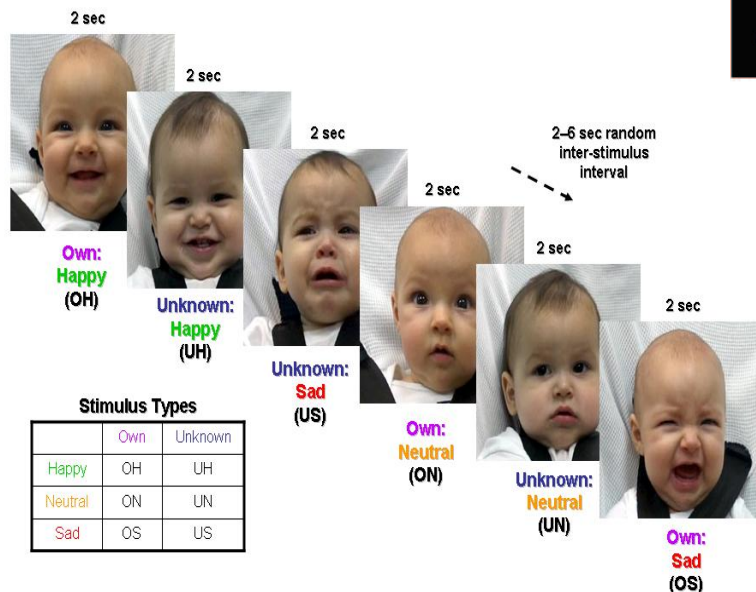
High

Infant Faces are Rewarding and Cute



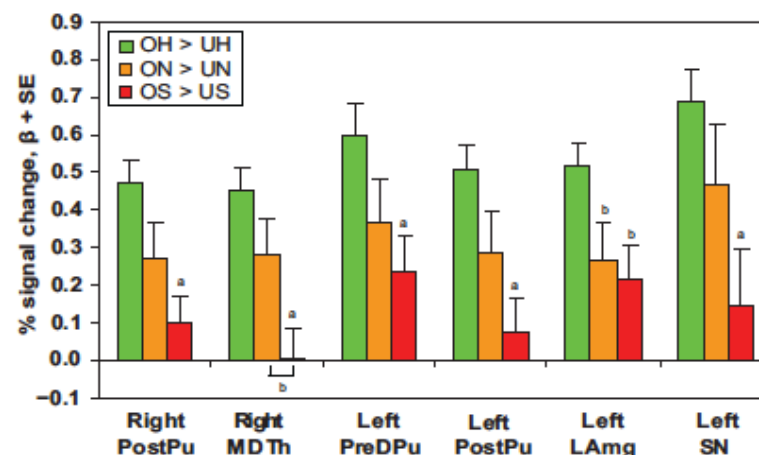
Glocker et al. (2009)

Infant Faces are Rewarding – especially when they are smiling

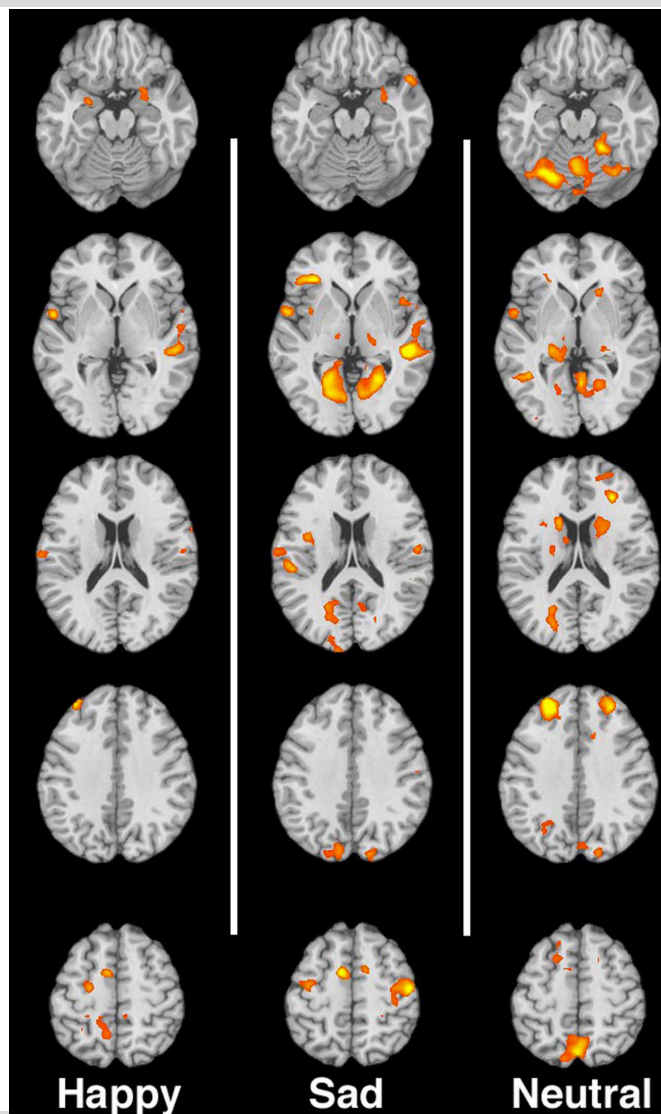


Own > Unknown Contrast (affect groups combined)
Own-Happy > Unknown-Happy Contrast

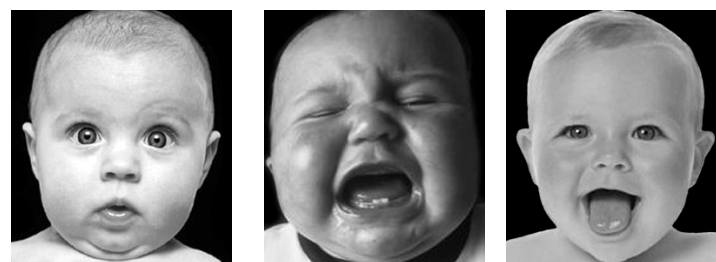
Own vs Other: VTA/SN, striatum, mPFC, ACC, insula



Decreased Reward / Salience in Addiction

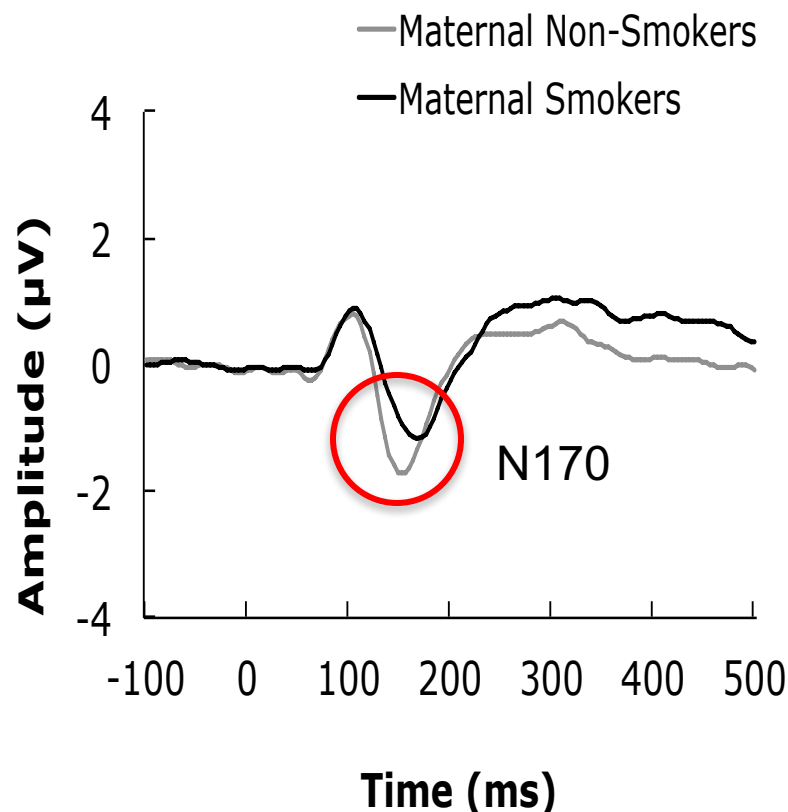


Substance users showed reduced activation in prefrontal regions, including the dorsolateral and ventromedial prefrontal cortices and limbic regions (Landi et al., 2011)



Maternal Smoking

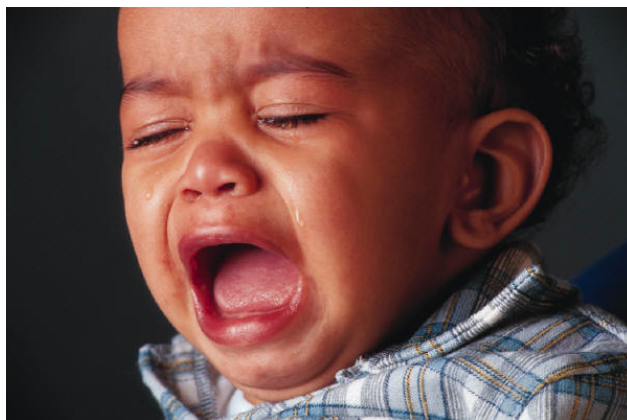
- N170 delayed in smoking vs non-smoking mothers viewing infant faces
- Increasing nicotine dependence associated with increasing delay



Rutherford et al. (2016)



- Infant cues are inherently rewarding
 - Even in non-parents
- Emerging evidence suggests that infant cues may be less salient to substance-using mothers as compared to controls
 - Decreased neural response (fMRI)
 - Delayed neural response (ERP)
- Highlights the importance of reward to engagement with infant cues

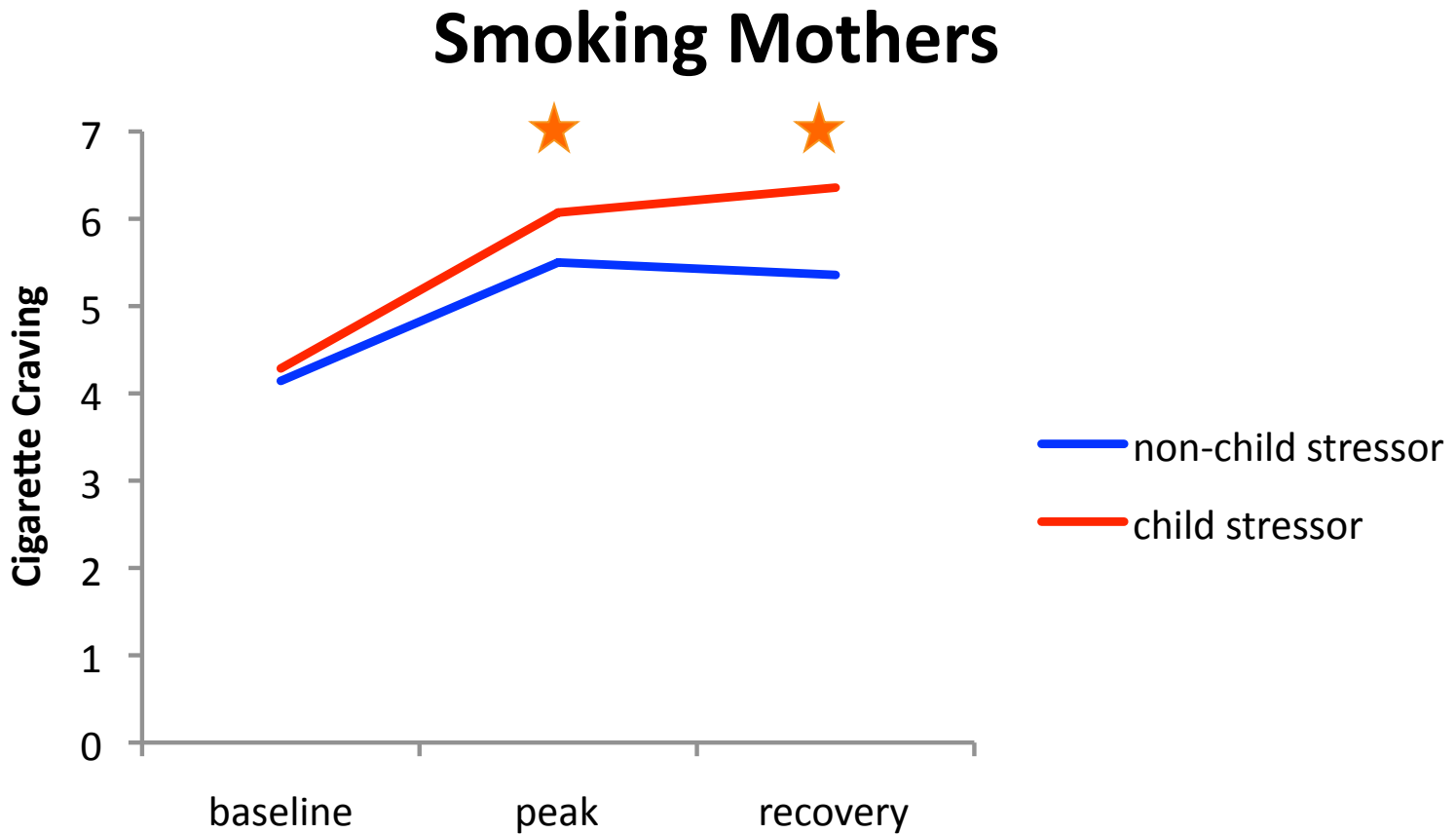


Stress and Addiction

- Substance use has been well associated with stress-related symptomatology (negative reinforcement model)
- Exposure to stress increases subjective reports of craving that correlate with activity in brain regions such as dorsal striatum and caudate
 - Activation in neural circuits during stress inductions appear to overlap with activation in neural circuits during cue-induced drug craving inductions

Sinha, 2001; Sinha et al., 2005; 2007

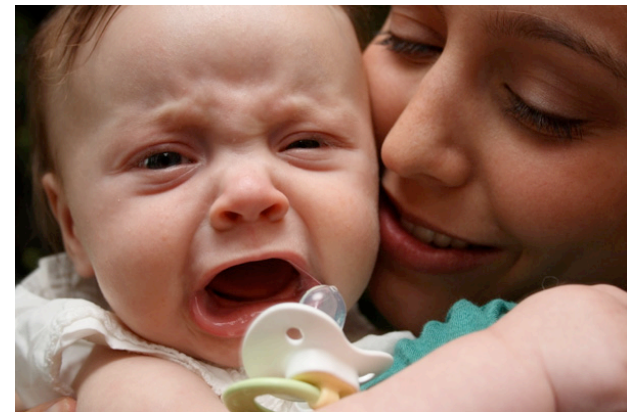
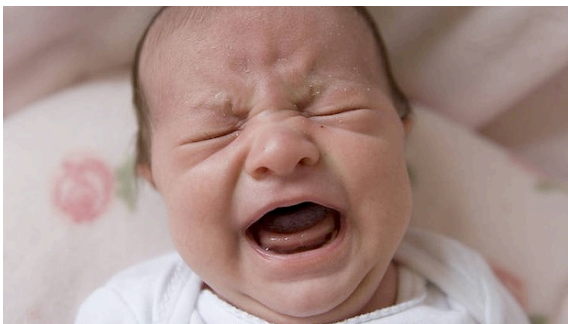
Craving for Cigarettes



Rutherford & Mayes (unpublished data)

Infant Signals as Stressful: Cries

- A challenge for a new parent is regulating stress when caring for new infant
- Tolerance of distress is compromised in addiction
- Can we assess this capacity in an experimental but ecologically valid way?

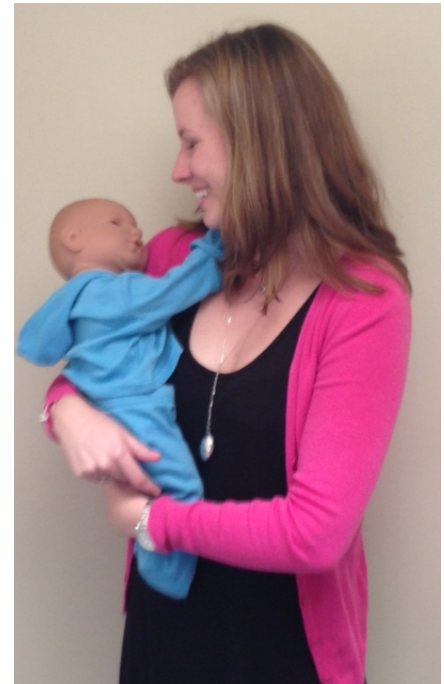
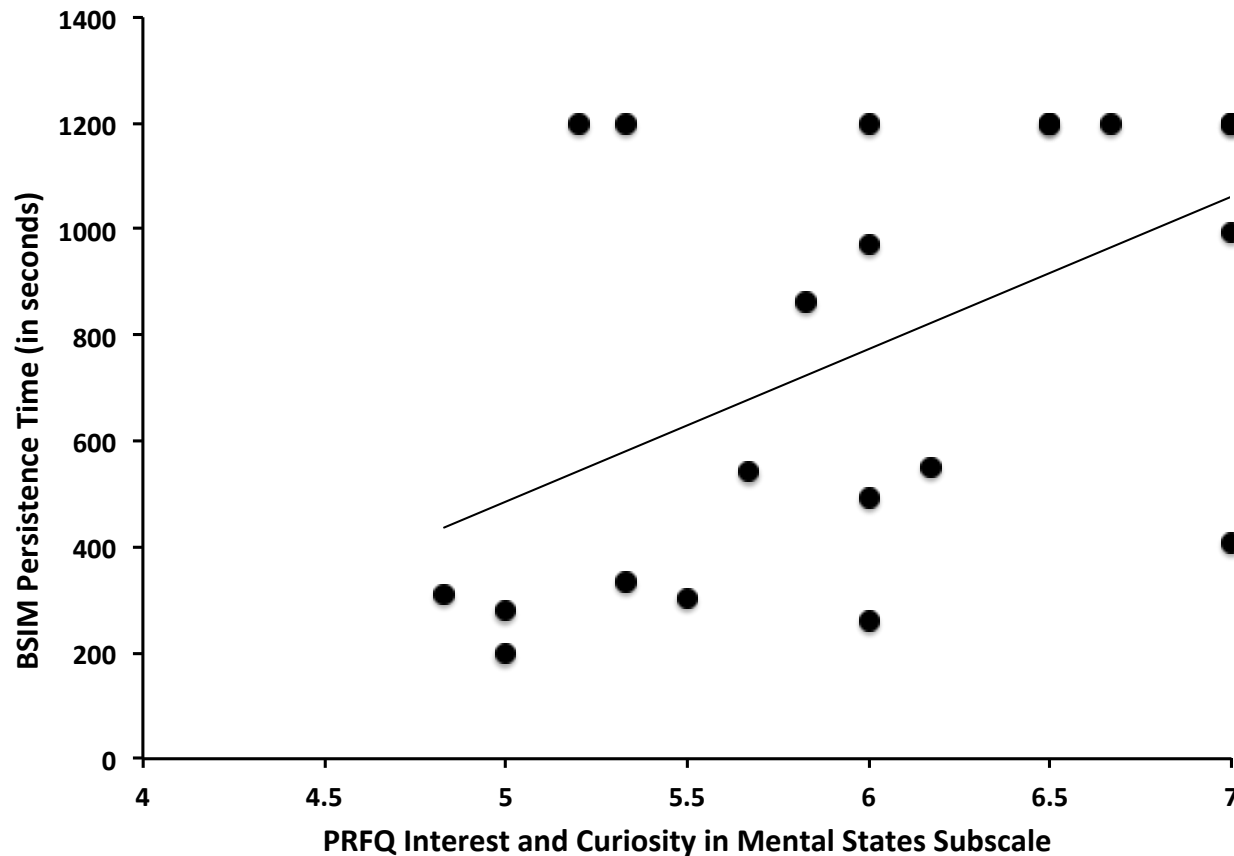


Baby Simulator (BSIM)

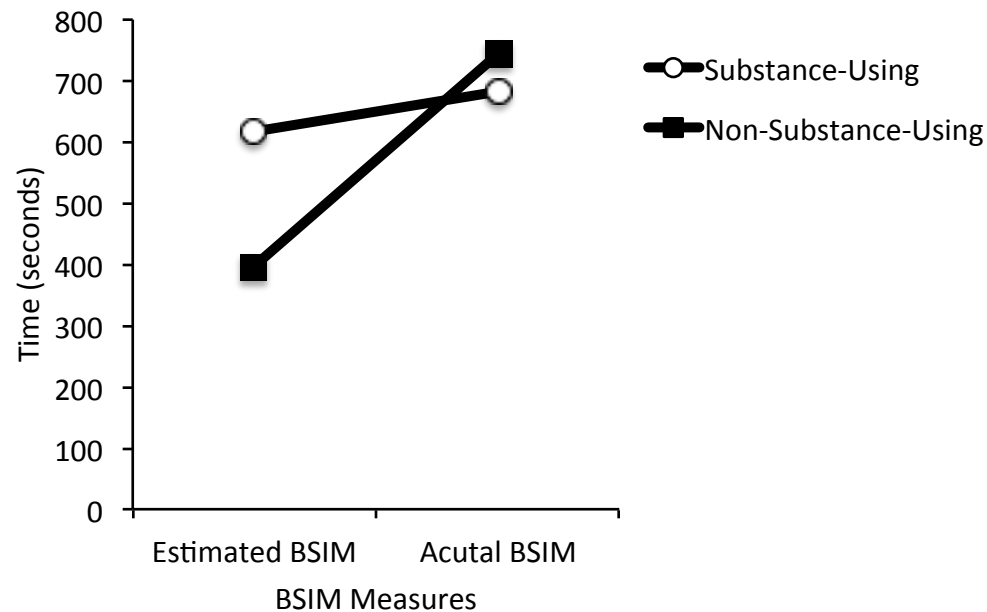
- Designed to be 4-6 mos old
- Computer controlled to generate cries
- Certain behaviors (e.g., feeding, rocking, diaper changing) can soothe the simulator



BSIM and PRFQ



BSIM and Maternal Substance Use



Rutherford et al. (in prep)

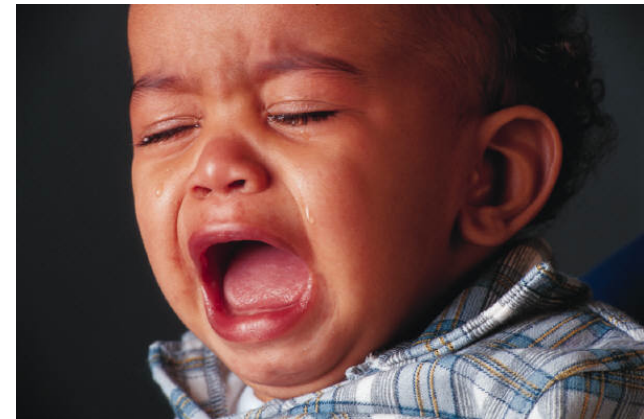
Stress-Reward Interactions?



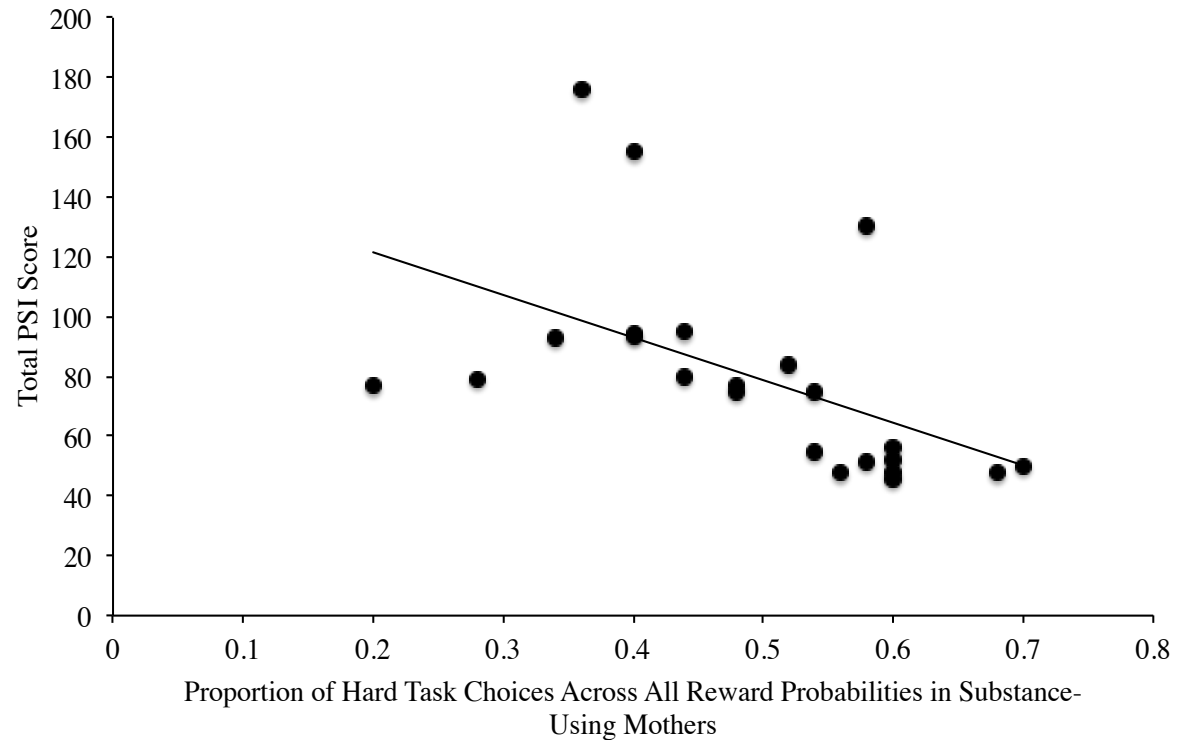
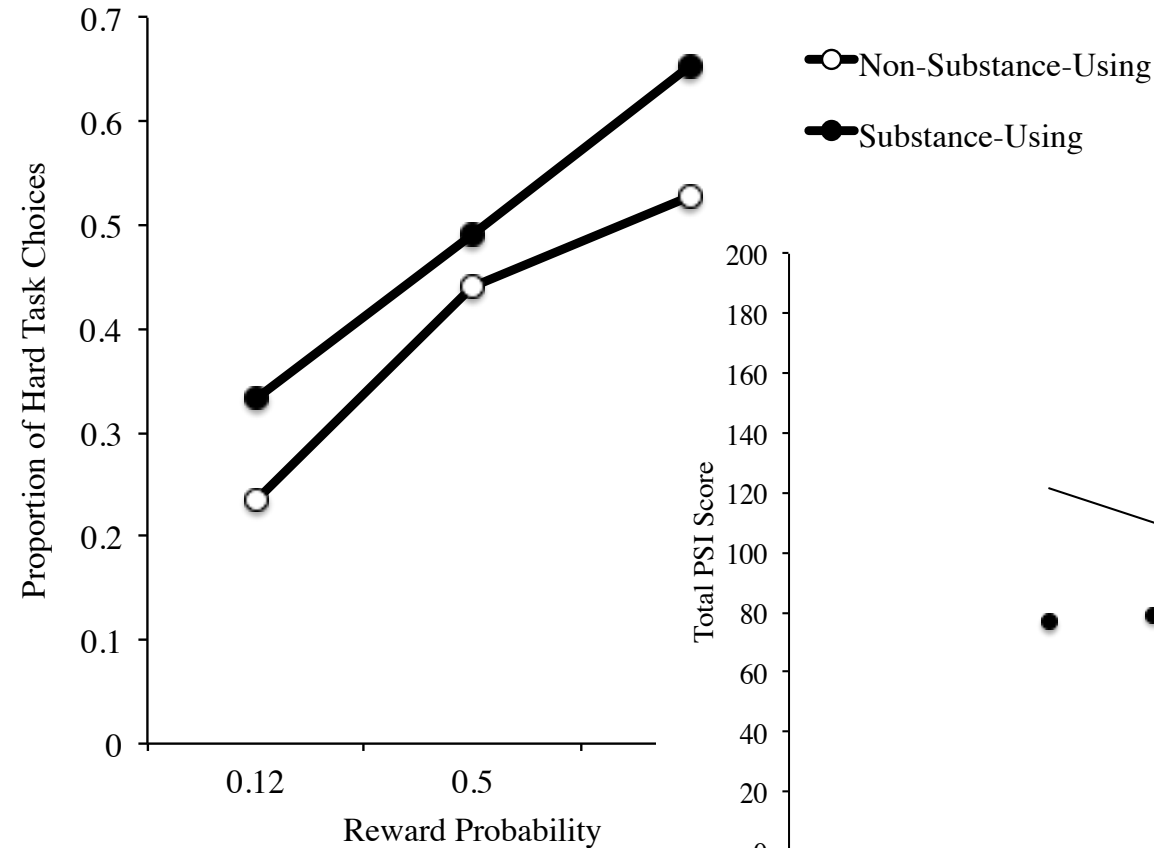
Reward



Stress



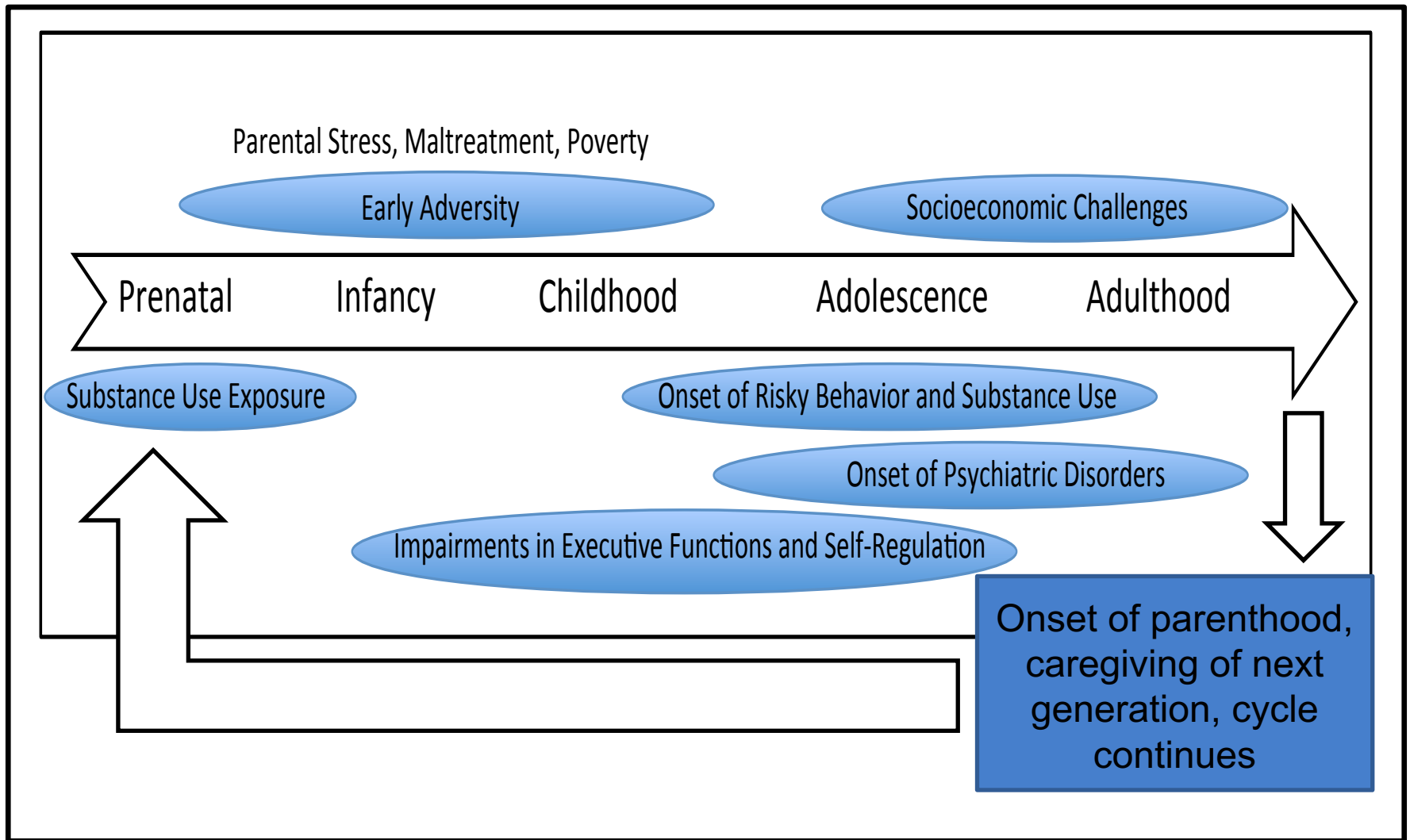
Effort-based Incentive Motivation Tasks



Advancement of this Model

- Addiction typically presents in patients managing a host of socioeconomic, interpersonal, and psychiatric challenges.
 - The extent to which brain and behavioral correlates of addicted parenting truly reflect substance abuse and dependence or the myriad of factors that are associated with addiction requires further investigation
- Addiction as a developmental disorder
 - Early adverse experiences may shape neurocognitive functioning across development and increase vulnerability to substance use in adolescence and adulthood, impacting next generation parenting
 - Intergenerational transmission of compromised caregiving?

McCrory & Mayes, 2015; Mayes & Suchman, 2006



Rutherford & Mayes (2017)

Implications for Intervention

TRANSLATION OPPORTUNITY

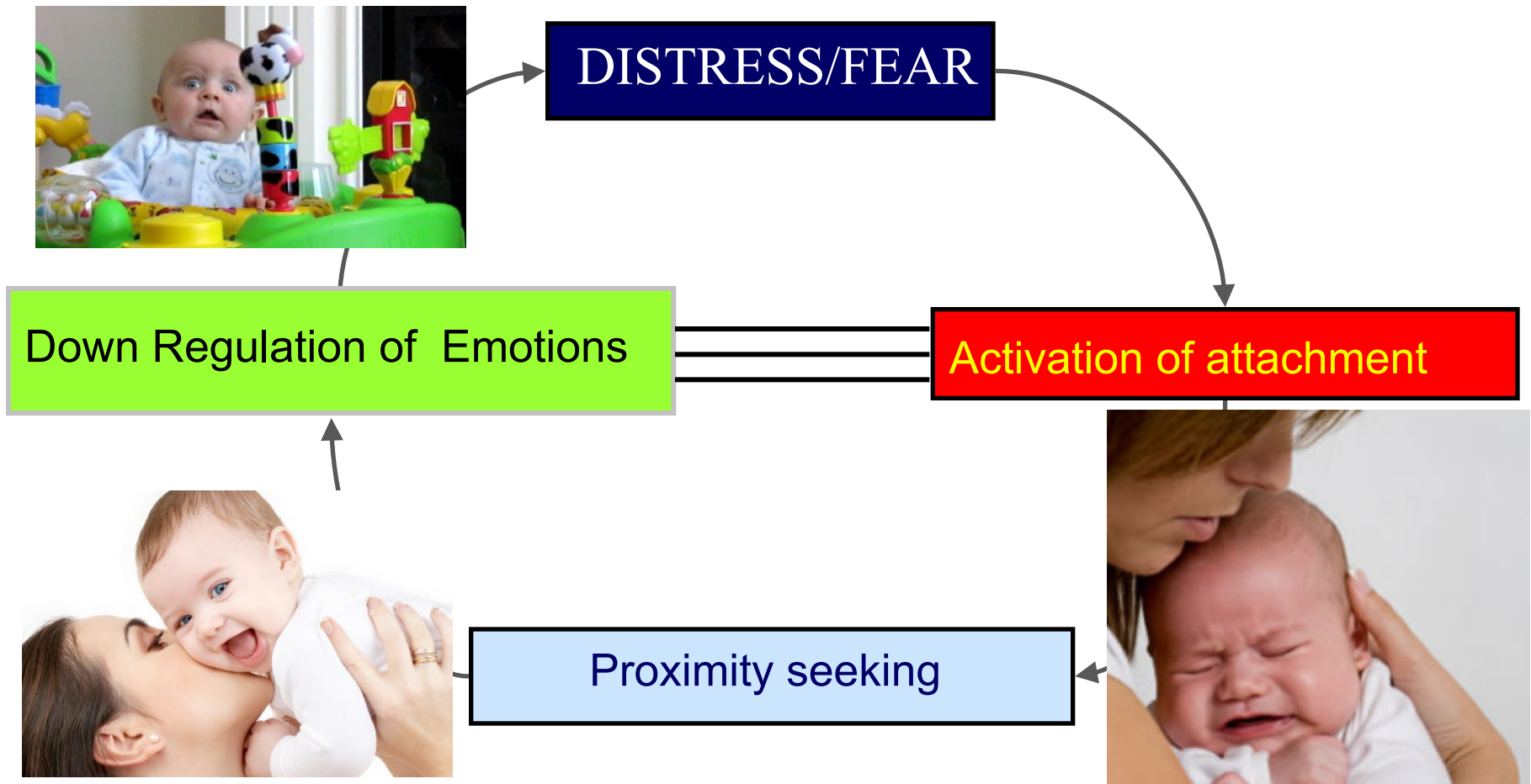
How Basic Science of Detecting and Responding to Infant Emotion Refines Prevention and Intervention Programs for Parents



A Common Parenting Story

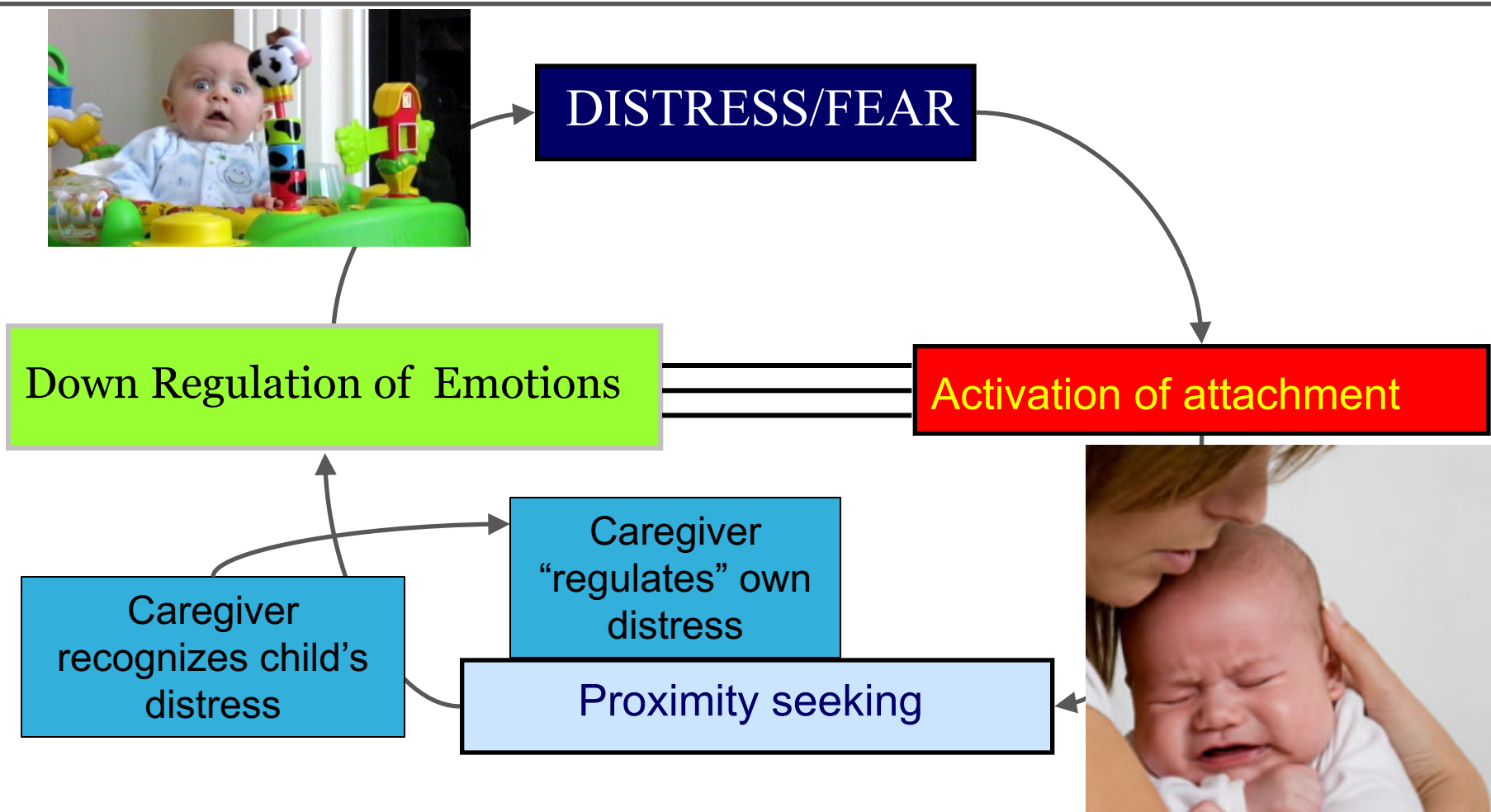


Attachment Models



*Luyten, P., Mayes, L.C., Fonagy, P., & Van Houdenhove, B. (2012). The interpersonal regulation of stress.

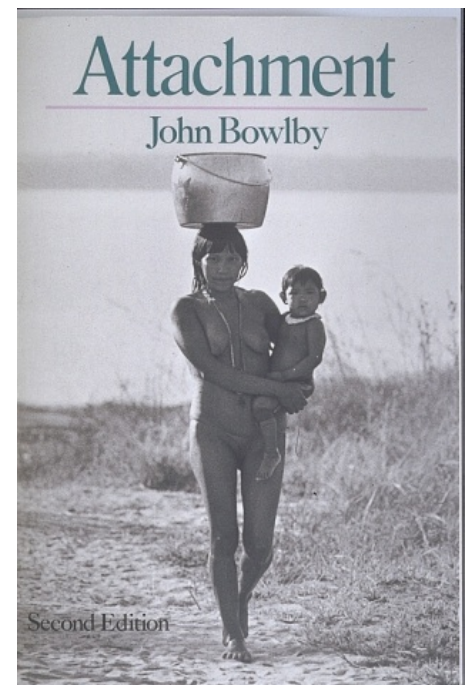
Opening up the “Blue Box”



*Luyten, P., Mayes, L.C., Fonagy, P., & Van Houdenhove, B. (2012). The interpersonal regulation of stress.

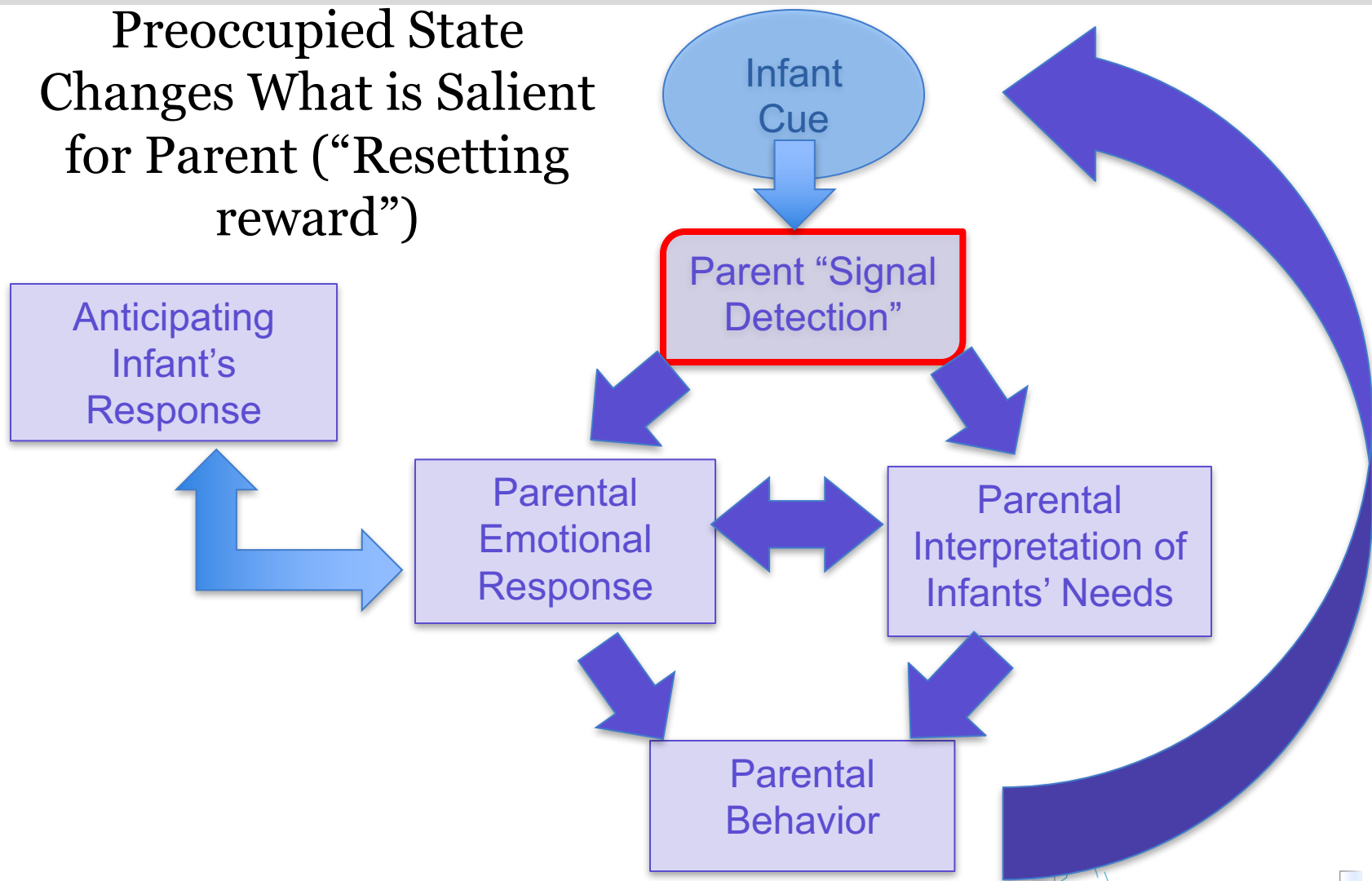
The adult transition to parenthood

- Becoming a parent brings a change in mental “economy” with a shift in attention (“enhanced signal detection” or sensitivity to infant cues—greater reward) and increased emotional responsiveness



Parenting Side of Attachment Response

Preoccupied State
Changes What is Salient
for Parent (“Resetting
reward”)

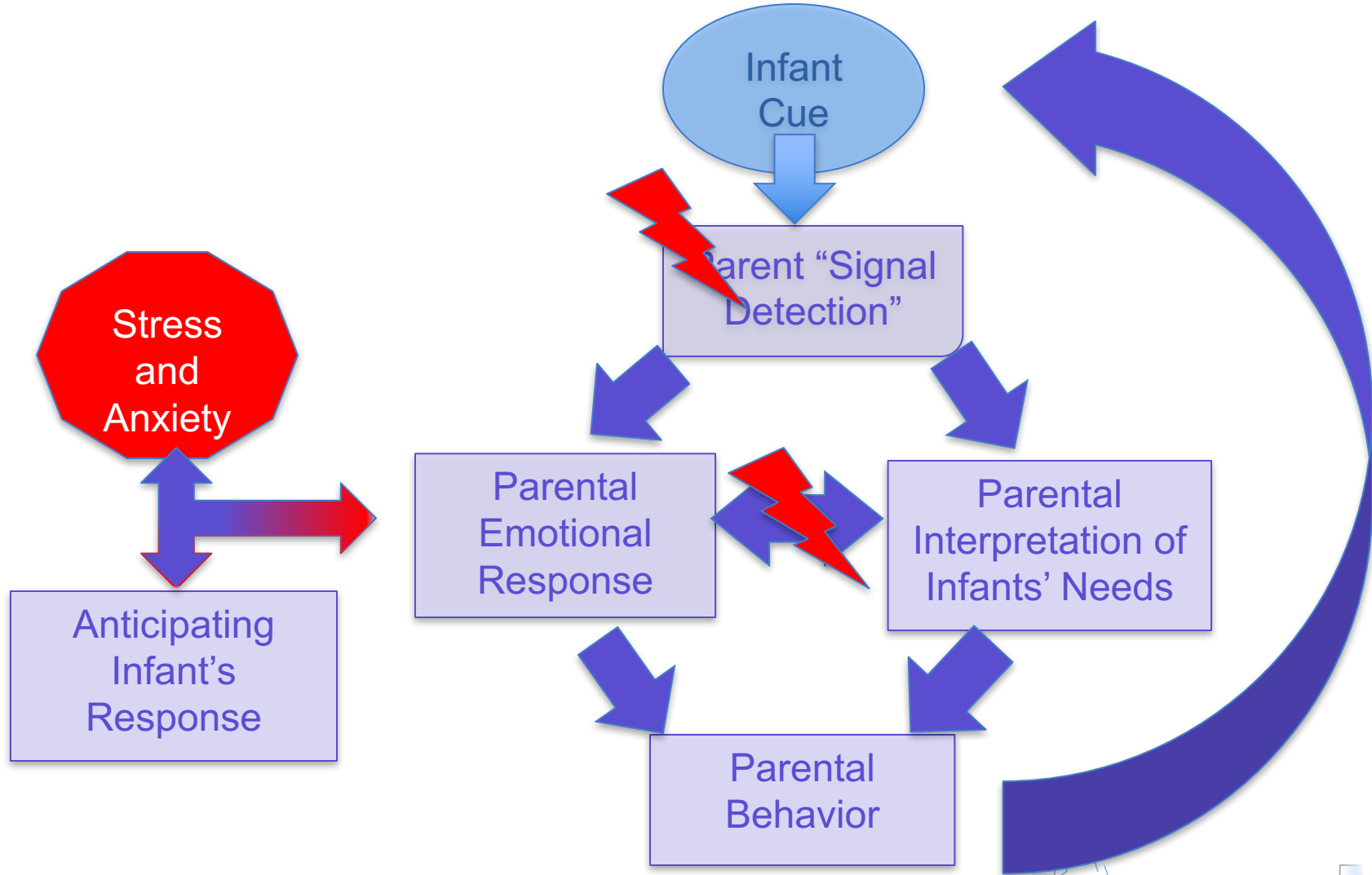


THREATS TO CHANGING PARENTAL MENTAL ECONOMY

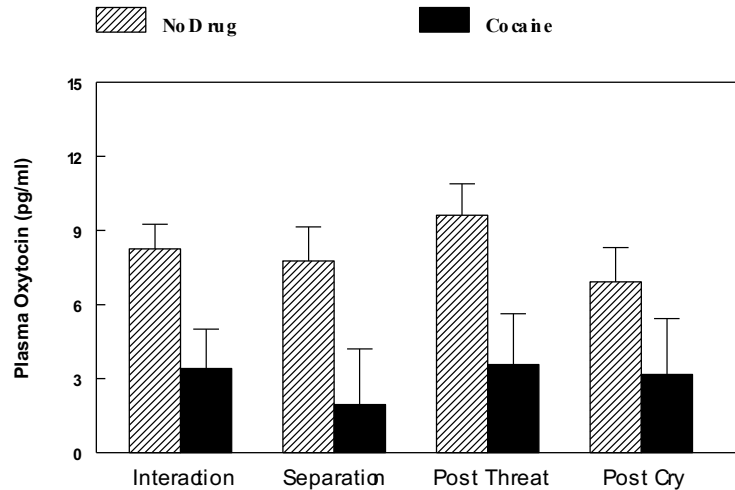
- Early Adversity in Parent's Own Childhood Impacting Stress & Reward Response Systems
- Current Depression, Addiction, Anxiety
- Chronic Stress related to Poverty, Domestic Violence



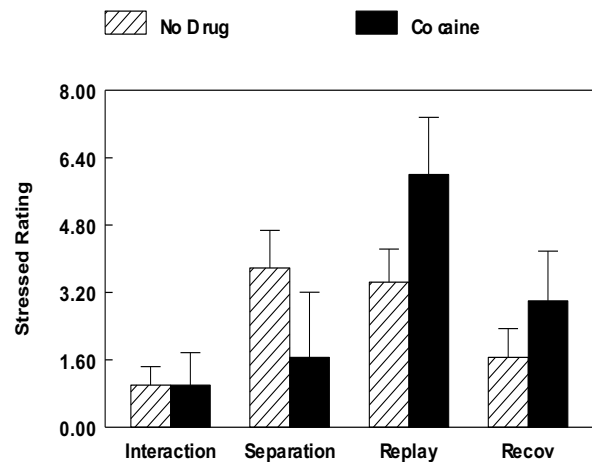
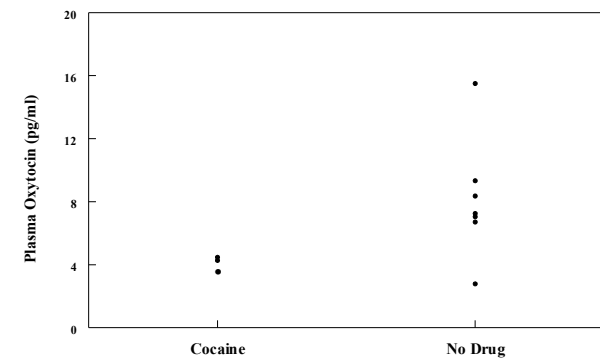
How Early Adversity/Chronic Stress Disrupts Parental Responding



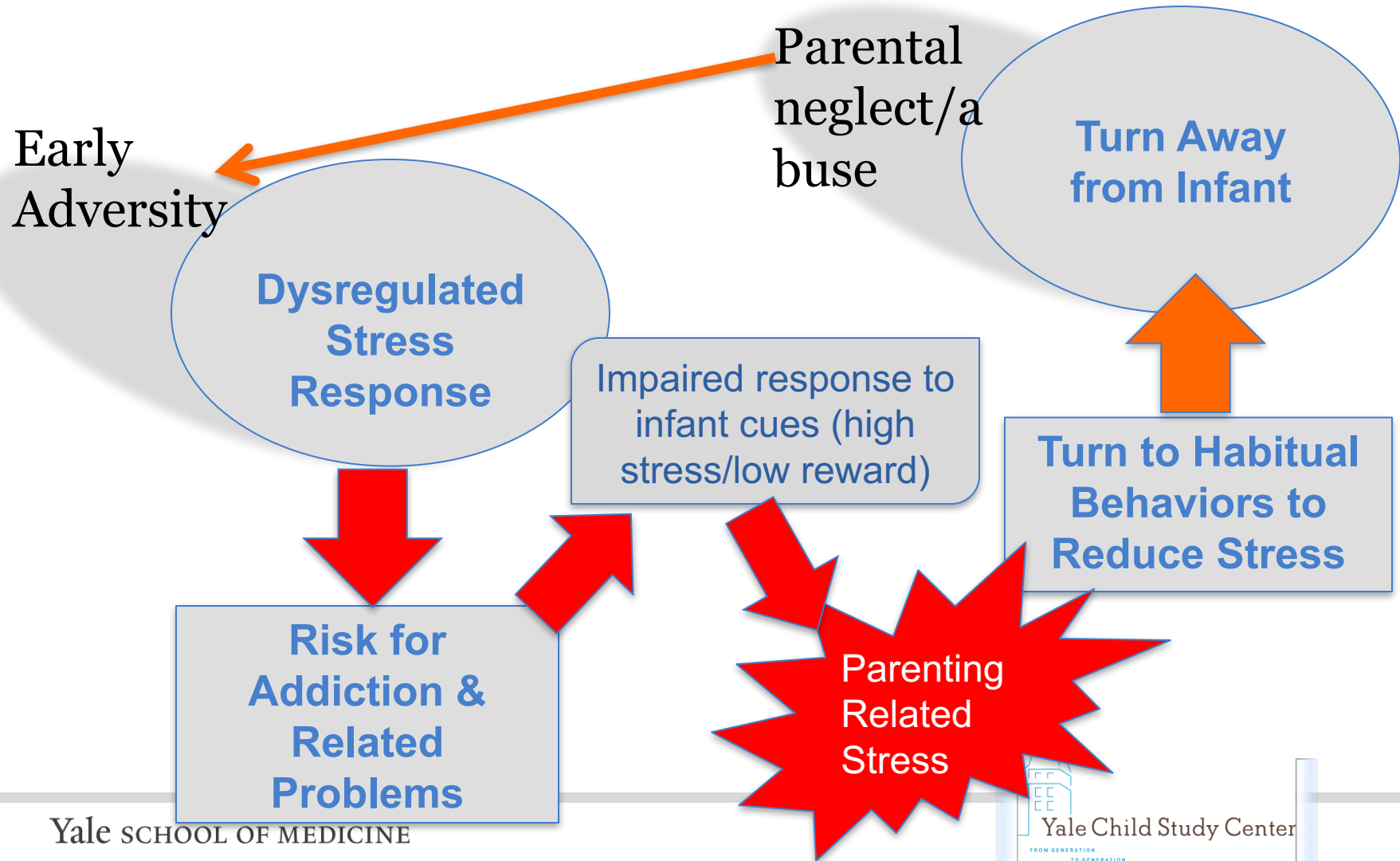
Cocaine-Using Mothers Show Diminished Oxytocin Response and Greater Perceived Stress in Response to Infant Cries



Oxytocin during SPEECH REPLAY



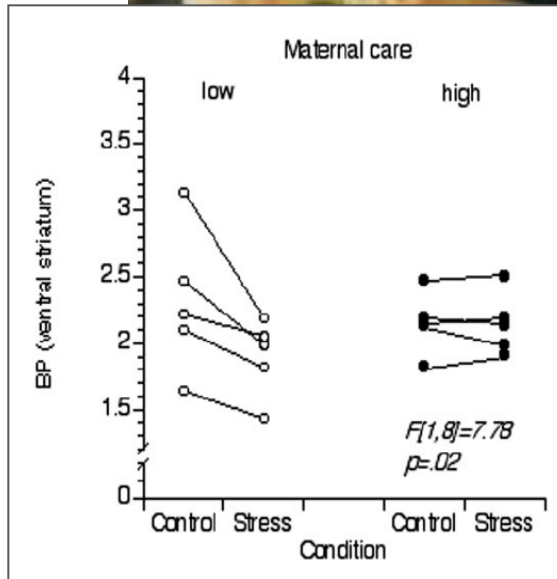
How Early Adversity Impacts Parenting and for the Intergenerational Transmission of Early Adversity



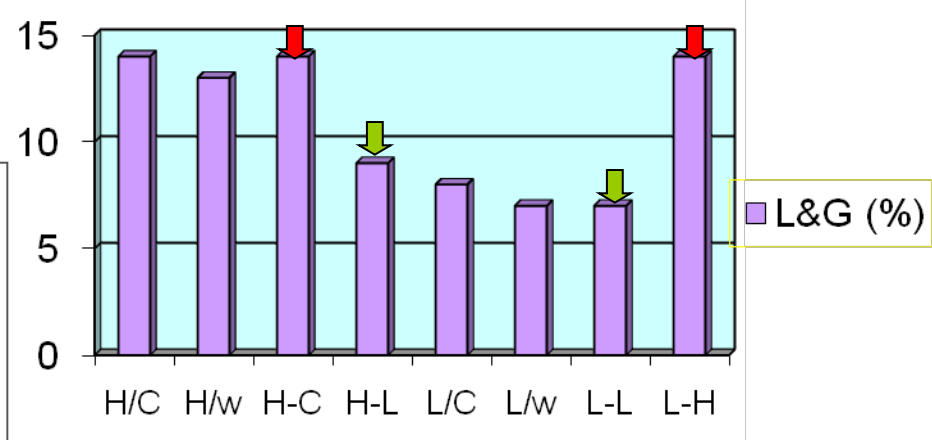
Intergenerational Transmission of Parental Care



Individual differences in maternal behavior related to rearing, rather than biological, mother



Low Maternal Care in Humans Associated with Greater Striatal Dopamine Response to Stressor as Adult (Pruessner, et al, 2004)*



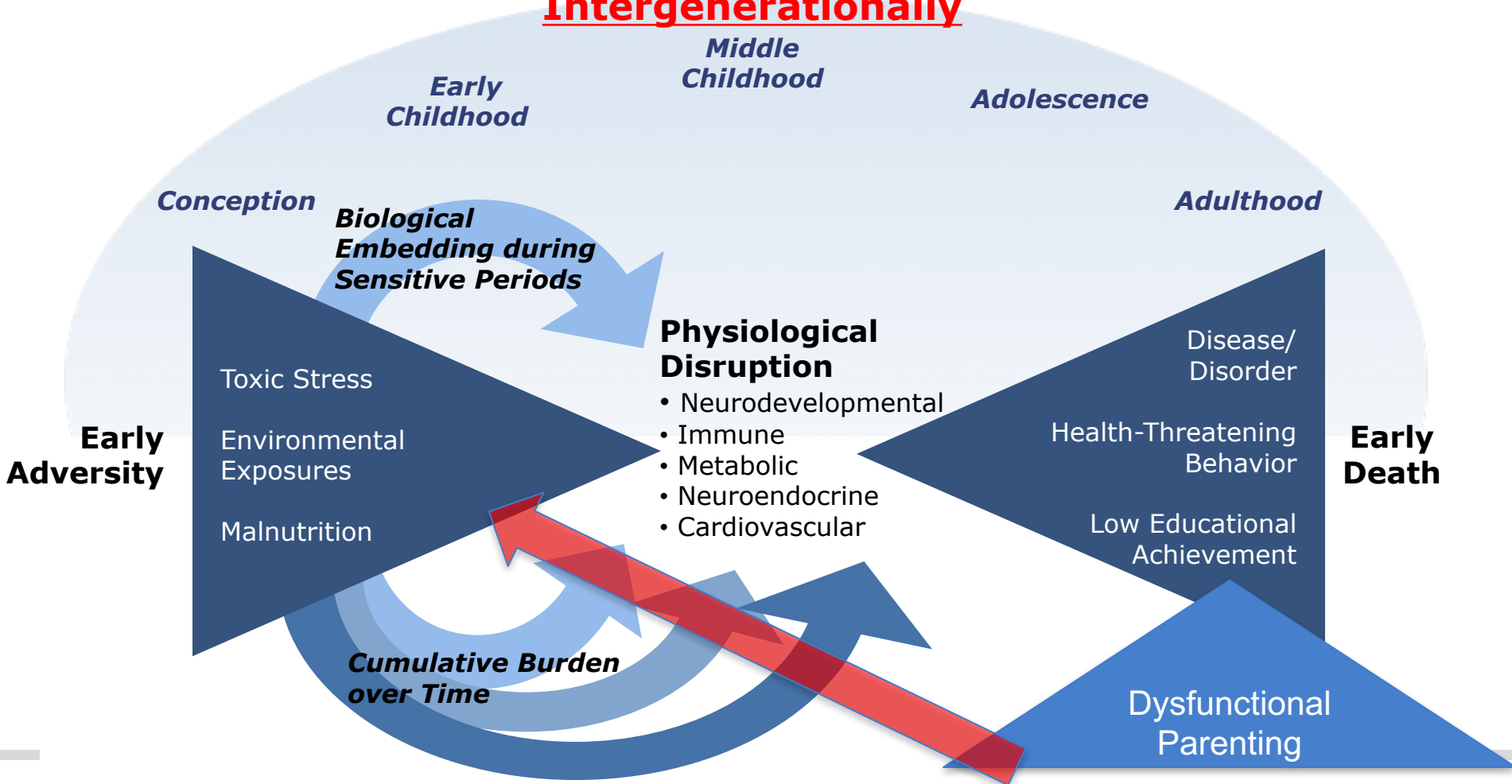
Francis, et al, 1999



Individual differences in early care change regulation of gene expression

"Parent as we were parented...."

The Childhood Roots of Health **and Parenting** Disparities: How Adversity is Built Into the Body **and Transmitted** **Intergenerationally**



Interventions around Early Adversity

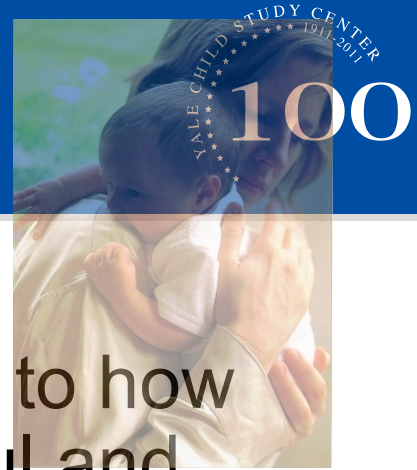
*Interventions Emphasizing
Preventing Adverse
Experiences for Children and
Enhancing Later Adaptive
Outcomes*



*Complementary Intervention Arm
is Understanding How Adults
Transition to Parenthood,
Effect of Adversity on
Parenting, and Working
Directly with Parents*

INTERVENTION APPROACH

- Focus on adult's needs as a parent
- Focus changes from “what baby needs” to how demands of caring for infant are stressful and impact understanding infant's needs and how parent perceives and experiences the infant's cries
- Focus on increasing adults' distress tolerance/capacity to maintain decision making in face of stress/ remain mindful of own and child's emotional states



COMMUNITY PROGRAMS & PARENTING IN CSC & COLLABORATING DEPARTMENTS

Discover Together

Minding the Baby

Moms Partnership
(Megan Smith)

Mothering from
Inside Out (Nancy
Suchman)

MOMBA
(Smith & Mayes)

Family and Child
Resilience
Project

Family Support
Services and
Family Based
Recovery (Jean
Adnopoz)

Fathers Involved in
Domestic Violence
(Carla Stover)

Fathers and
Substance Abuse
(Tom McMahon)

Two Complementary Approaches in Programs for Parents

Parental Mindfulness/Mentalization



Psychological ability allowing us to make sense of the actions of others as well as our own actions by reference to desires, thoughts, memories, feelings

Parental Social Networks/Building Community

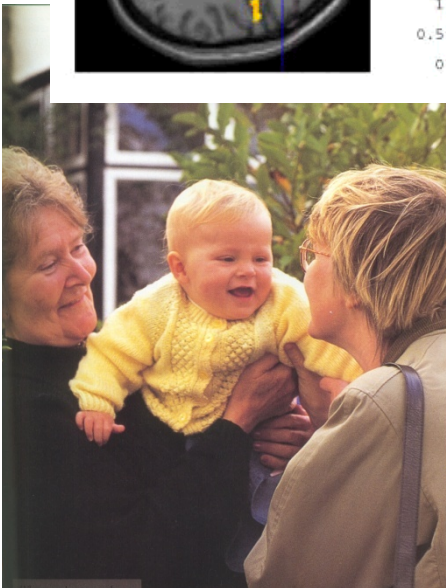
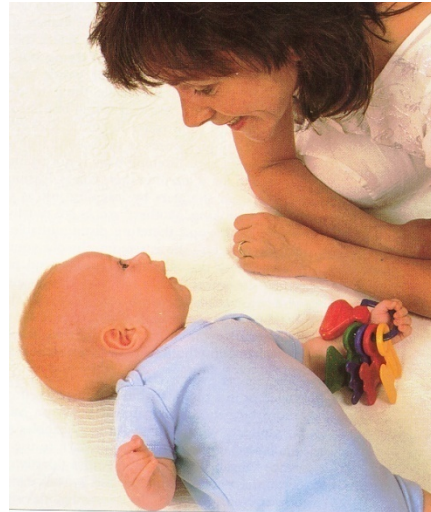
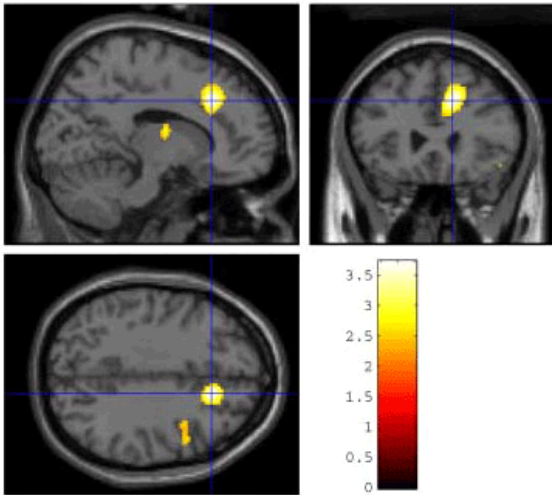


Social relationships, or the relative lack thereof, constitute a major risk factor for health—rivaling the effect of well established health risk factors such as cigarette smoking, blood pressure, obesity and physical activity

House, Landis, & Umberson; Science 1988

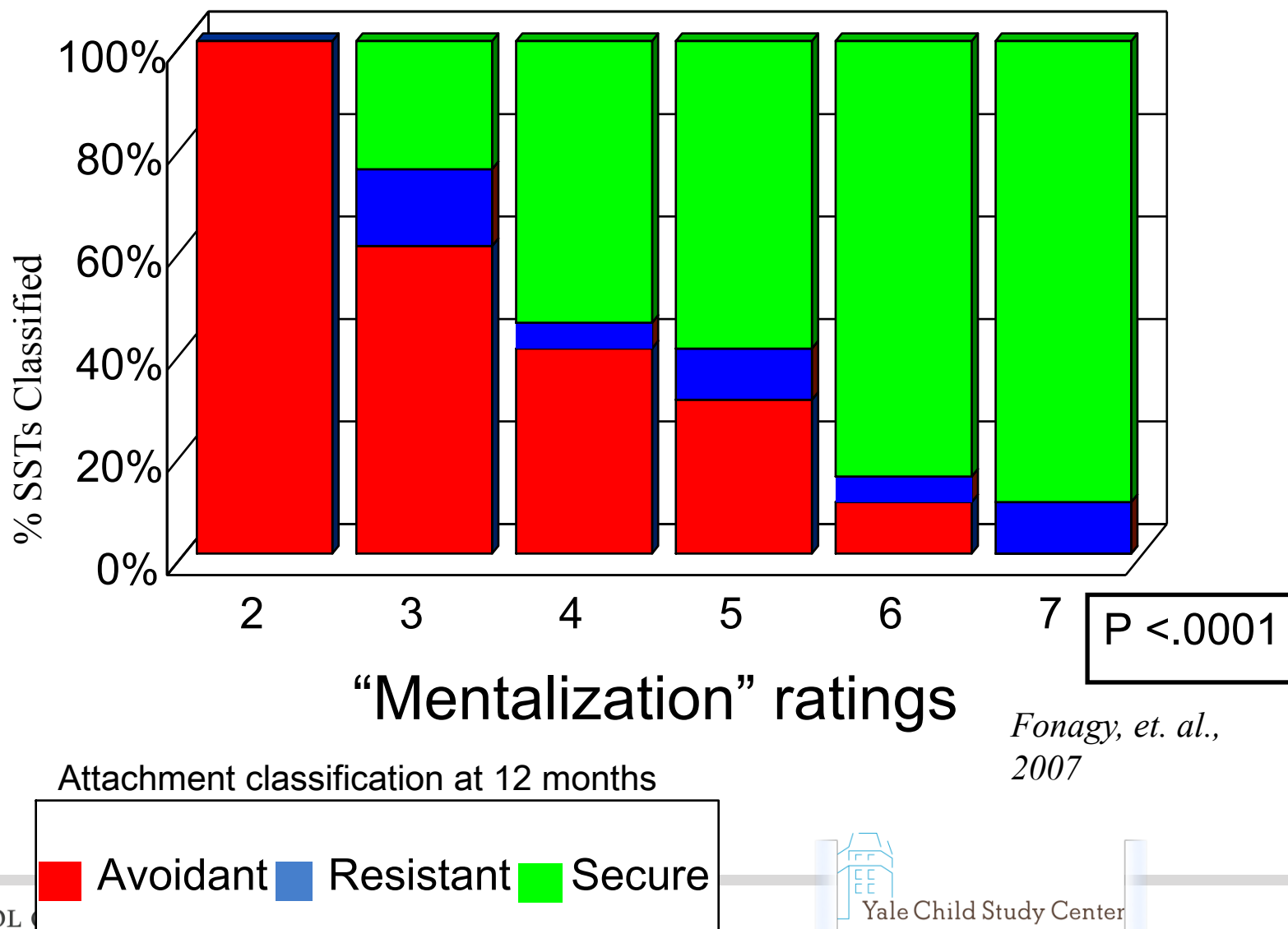
How Parental Care Gets into Body, Brain, & Mind

Thinking about others' minds ("mentalization")



Children learn about their own feelings and about caring for others through interactions in which their parents acknowledge their child's "mind"-- feelings, needs, and wishes.

Mother's "Mentalization" Predicts Infant-Mother Secure Attachment 1 year



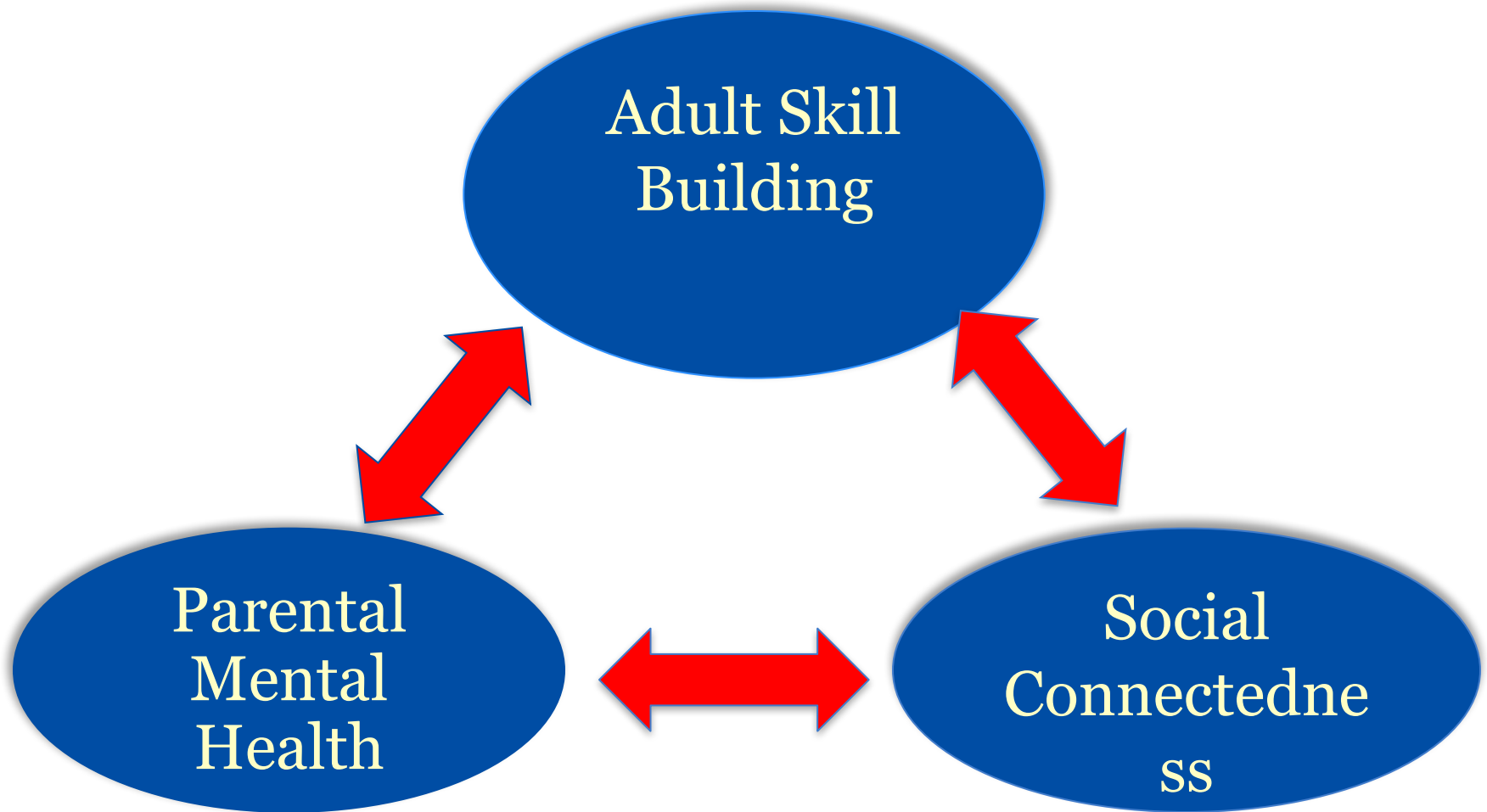
How Social Networks Affect Health

- Social influence (e.g. norms and social control)
- Social engagement
- Person-to-person contacts (e.g. pathogen exposure, secondhand smoke)
- Access to resources (e.g. money, jobs, information)
- The provision of social support (perceived and actual) and relation to stress mediation/regulation



Berkman & Glass 2000; slide from Megan Smith

Helping Parents at Many, Interconnected Levels

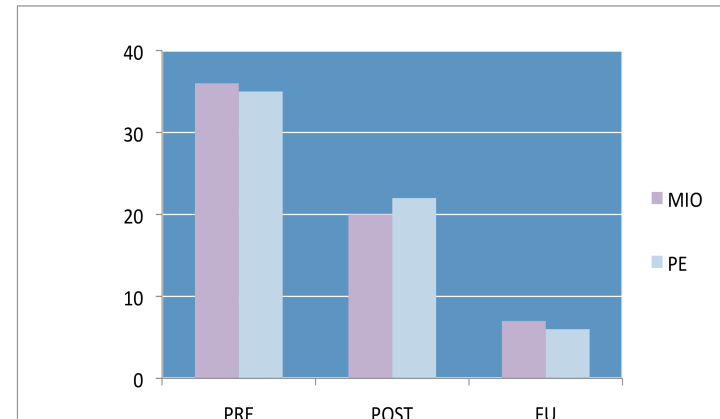


Mothering from the Inside Out



Relationship/reflectiveness-based therapy for mothers with substance use

Mothers Substance Use



Nancy Suchman and colleagues

New Haven Mental Health Outreach for Mothers (MOMS) Partnership



Megan Smith

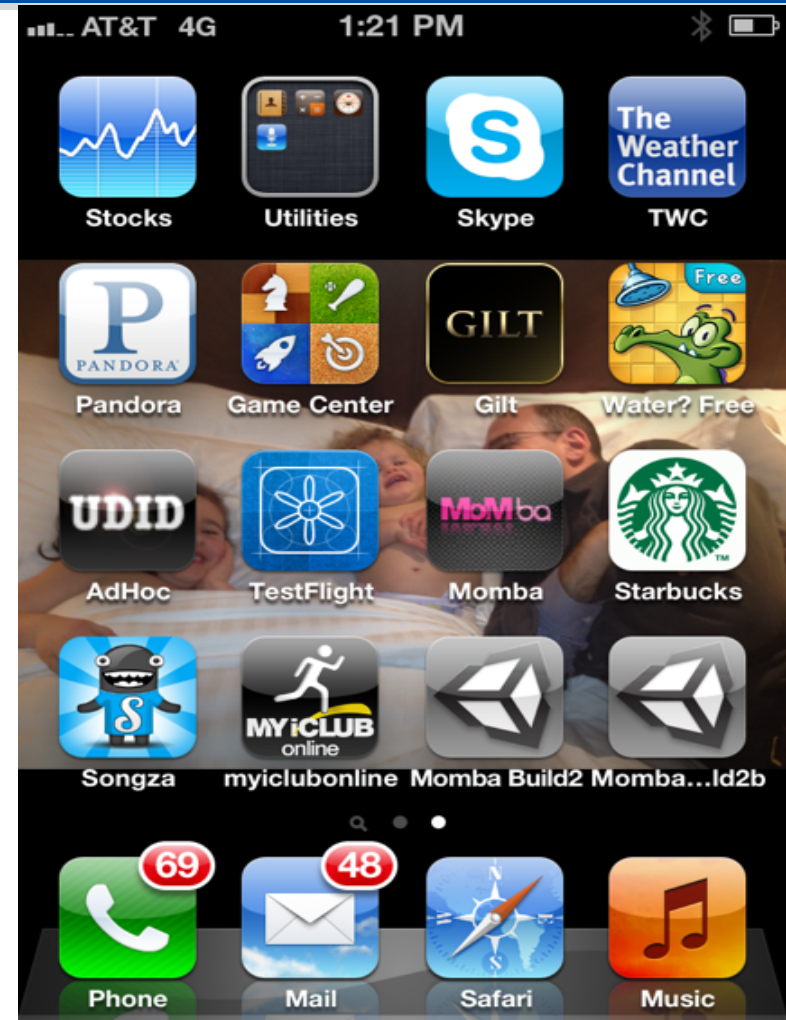
Creating new social networks by uniting young, low-income, racially and ethnically diverse, pregnant and parenting women in New Haven with those individuals and institutions dedicated to the emotional and physical wellness of women



THE NEW HAVEN
MOMS PARTNERSHIP



Promoting the Social Connectedness & Mental Health of Mothers



NIMH R34MH100456-01

Parenting as an Adult Developmental Stage

- Transition to parenthood is a key adult developmental phase; and an adult's development as a parent is key to healthy child development
- Transition to parenthood involves key changes in mental economy (preoccupation), in perceptual sensitivity, and in neural reward and stress systems
- Understanding the psychobiology of parent development informs the shape of prevention and intervention programs for families
- Integration of services for adults as parents with services for children offers the opportunity to impact multiple generations and especially the parenting by those children when they are adults



Psychoanalysis

Developmental
Psychopathology

Developmental
Biology

Philosophy of
Mind

Social
Neuroscience

Thank you!

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