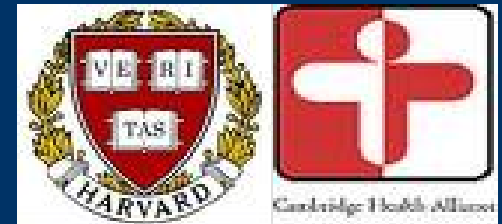


When Love Goes Awry: Varieties of Adaptation in the Early Attachment Relationship

Karlen Lyons-Ruth, Ph.D.

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Notre Dame Conference

October, 2012





Childhood adversity and later health: The ACE Study

The Adverse Childhood Experiences Study found that childhood adversity (self-reported abuse or neglect) accounts for 50-75% of the risk for

- alcoholism,
- drug abuse,
- depression,
- suicide.

And for increased risk for

- ischemic heart disease,
- neurological problems,
- obstructive pulmonary disease,
- liver disease,
- obesity.
- premature death.

Dong et al., 2003; Anda et al., 2006; Anda et al., 2002; Dube et al., 2006; Dong et al., 2004, Wegman & Stetler, 2009; Anda et al., 2008.; Williamson et al., 2002

-
- Mechanism for long term effects early experiences?

Nongenomic Transmission Across Generations of Maternal Behavior and Stress Responsiveness in the Rat

Randomly assigned infants to low-nurturing and high-nurturing rat mothers.

Regardless of genetic inheritance:

- ❑ Increased stress response in infancy
- ❑ Earlier puberty
- ❑ Enhanced sexual activity
- ❑ Decreased investment in nurturing offspring
- ❑ Offspring with increased stress responses

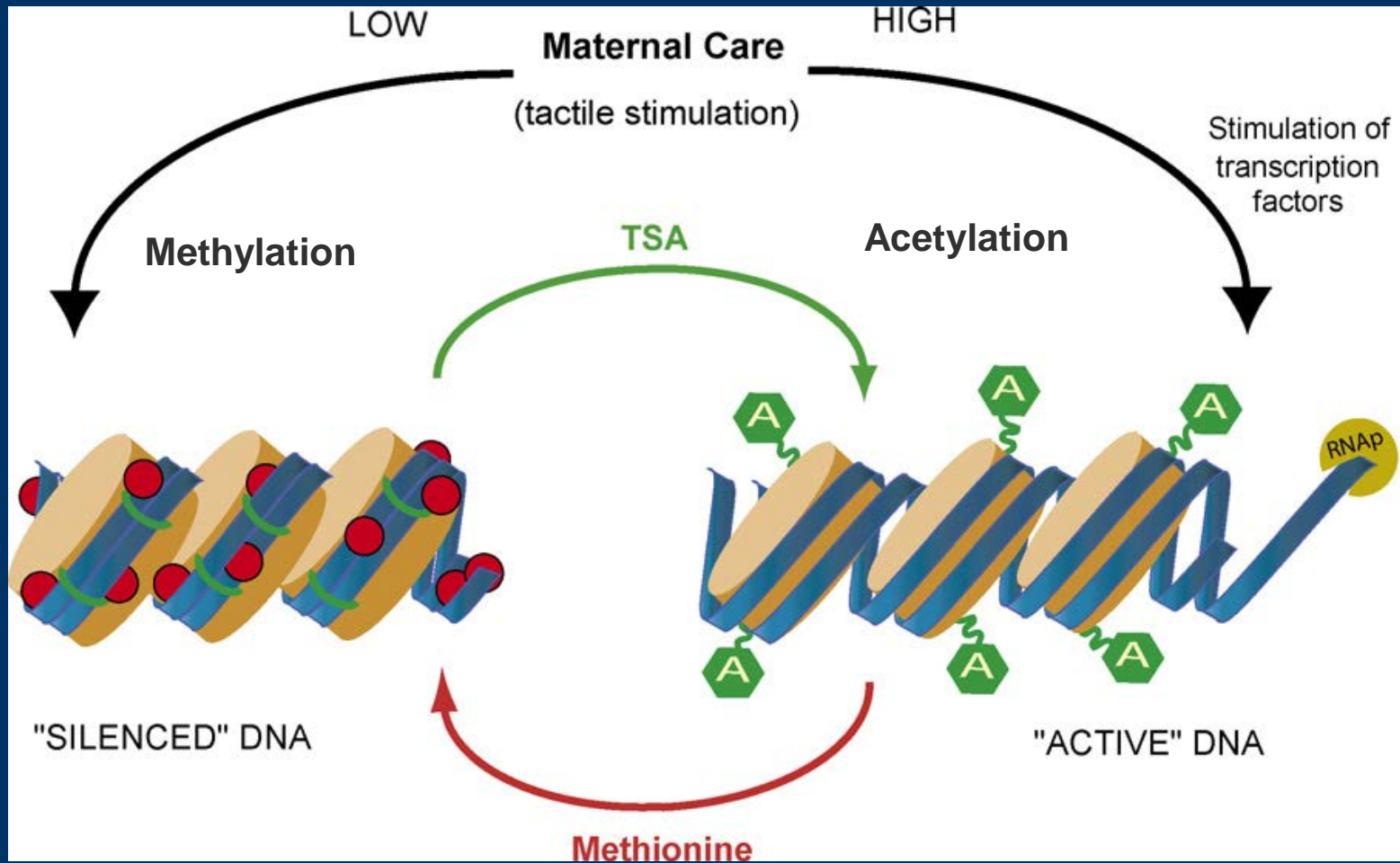
e.g. Francis et al. , *Science*, 1999; Champagne et al., *Physiol & Beh.* 2006

Abstracts of the Society for Neuroscience

Weaver & Meaney (2000)

- At *6 days of age*, hippocampal cells were removed and assessed for levels of messenger RNA expressed for 1,176 genes.
- There were significant differences in the expression of 324 genes of 4 basic types:
 - Genes regulating brain formation and function (GABA, glutamate, dopamine)
 - Genes important for neuronal development.
 - Genes controlling aspects of synaptic transmission.
 - Genes involved in neuronal pathology.
- **Conclusion:** The caregiving experience of an animal changes the expression of its genes.

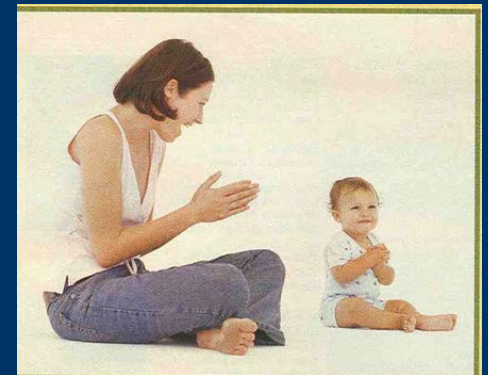
The Epigenetic Modification of DNA



From Champagne & Curley, *Neurosci. & Biobeh. Rev.*, 2009



What aspects of the early caregiving environment in humans confers risk for long-term maladaptation in adulthood?



Tipping points?

Study Samples

120 young adults

- aged 18-23
- low- income families: Incomes less than 200% poverty level
- 73% Caucasian
- 58% female

76 families followed longitudinally from infancy

- Half referred for concerns about the quality of care
- Referred families were all those identified within a defined mental health service area

Collaborators and Funding

Adolescent Study:

Nancy Hall Brooks, LicMHW, Clinical Coordinator
Bjarne Holmes, Ph.D., Project Director
Kate Hennighausen, Ph.D., Post-Doctoral Fellow
Ingrid Obsuth, Ph.D., Post-Doctoral Fellow
Laura Brumariu, Ph.D., Post-Doctoral Fellow
Laurianne Vuillez-Coady, M.D., Post-Doctoral Fellow

Middle Childhood Study:

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Infancy Study:

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MRI Collaborators:

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Funding Sources:

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- Fogarty International Research Center, RO3TW06014
- National Institute of Mental Health, R01MH 35122
- National Institute of Mental Health R03 MH30434
- National Institute of Child Health and Human Development, R01HD15328
- FH Leonhardt Foundation
- Borderline Foundation
- American Psychoanalytic Research Foundation
- Milton Fund, Harvard University
- NIH Catalyst Pilot Funding

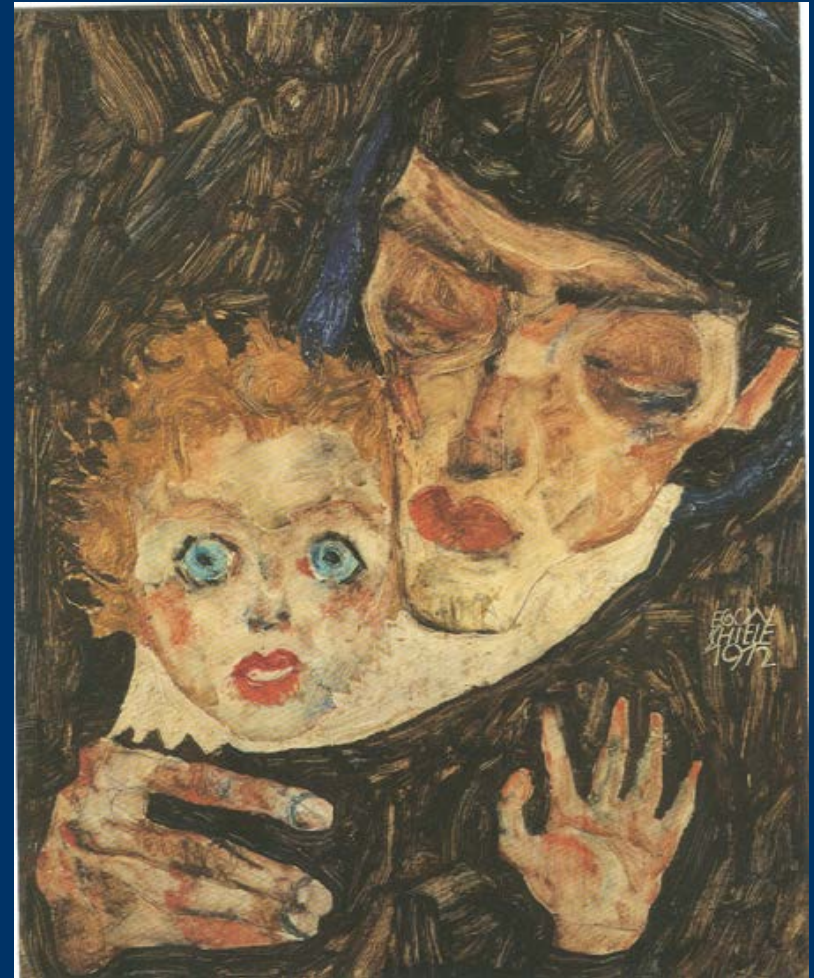


Three types of deviations in *infant behavior* that have been the focus of research in recent years :

- Disorganized –Avoidant attachment behavior
- Disorganized-Role-confused attachment behavior
- Indiscriminate attachment behavior

Types of Disturbances in Associated Caregiving Behavior?

- The caregiving contexts of these deviations have been much harder to Identify.



*
Attachment Research: 1980's and 90's
Infant Stress Regulation and Felt Security



Organized Attachment Strategies

Secure

**Insecure
Avoidant**

**Insecure
Ambivalent**

**Deactivating
Strategy:**

**Open Communication
Strategy:**

**Hyperactivating
Strategy:**

**Low Distress
Low Contact-Seeking**

**Flexible use of Distress
Flexible use of Contact-Seeking**

**High Distress
High Contact-seeking
Higher anger**

- Parental sensitivity related to infant security of attachment

(Metaanalysis: van IJzendoorn et al., 1995)

* Indicators of Disorganized Attachment Strategies in Presence of Parent

1. Dysphoric affect

Depressed affect

Fearful or apprehensive behaviors

2. Conflict behaviors

Inhibition of action already started

Freezing and stiling

Slowed underwater movements

3. Disoriented behaviors

Disoriented wandering

Confused or dazed expressions

4. Absence of a consistent behavioral strategy

Unexpected combinations of behavior sequences from different
organized patterns

Family Risk Factors and Incidence of Disorganized Attachment Strategies in Infancy

Middle-income low-risk group	13% (Main & Weston, 1981)
Middle-income low-risk group	19% (DeMulder & Radke-Yarrow, 1991)
Low-income control group	18% (Carlson et al., 1989)
Middle-income depressed group	25% (DeMulder & Radke-Yarrow, 1991)
Low-income control group	32% (Lyons-Ruth et al., 1990)
Middle-income alcohol intake	35% (O'Connor et al., 1987)
Middle-income depressed group	40% (Teti et al., 1995)
Middle-income bipolar disorder	50% (DeMulder & Radke-Yarrow, 1991)
Low-income depressed group	62% (Lyons-Ruth et al., 1990)
Low-income maltreating group	82% (Carlson et al., 1989)

Disorganization related to elevated cortisol after mild stressors

Spangler & Grossmann, 1993; Hertzgaard et al., 1995

Parental Sensitivity and Infant Disorganization?

Metaanalysis:

- 13 studies (N = 1951)
- Effect size small:

$$r = .10 **$$

Van IJzendoorn et al., *Dev. And Psychopath.*, 1999;

NICHD Early Child Care Research Network, *Ch. Dev.*, 1997

The Dilemma of the Disorganized Infant?

“Fright without Solution.”

The parent should be the source of comfort .

Parent is frightening to the infant.

OR

Parent is not *necessarily* frightening but is unable to provide soothing response.

Infant shows contradictory behavior toward parent when needing comfort.

Laboratory Observation: Maternal Disrupted Affective Communication (AMBIANCE coding system)

1. Negative-Intrusive Behavior

e.g. mocks or teases infant.

2. Role Confusion

e.g. draws attention to self when infant is in need.

3. Contradictory Affective Communication

e.g. talks in inviting voice but physically blocks infant's access.

4. Disorientation

e.g. Shows confused, frightened, or odd affect with infant

5. Withdrawal

e.g. interacts from a distance; interacts silently; walks around infant.

AMBIANCE Coding: Validity & Stability

- Meta-analysis of studies using the AMBIANCE coding system:

Good validity in relation to infant disorganization

$r = .35^{***}$ (N = 384; 6 studies)

Good stability for periods up to 5years

$r = .56^{***}$ (N = 203; 4 studies)

Metaanalysis: Madigan et al., Attachment & Human Development, 2006

Laboratory Observation: Maternal Disrupted Affective Communication (AMBIANCE coding system)

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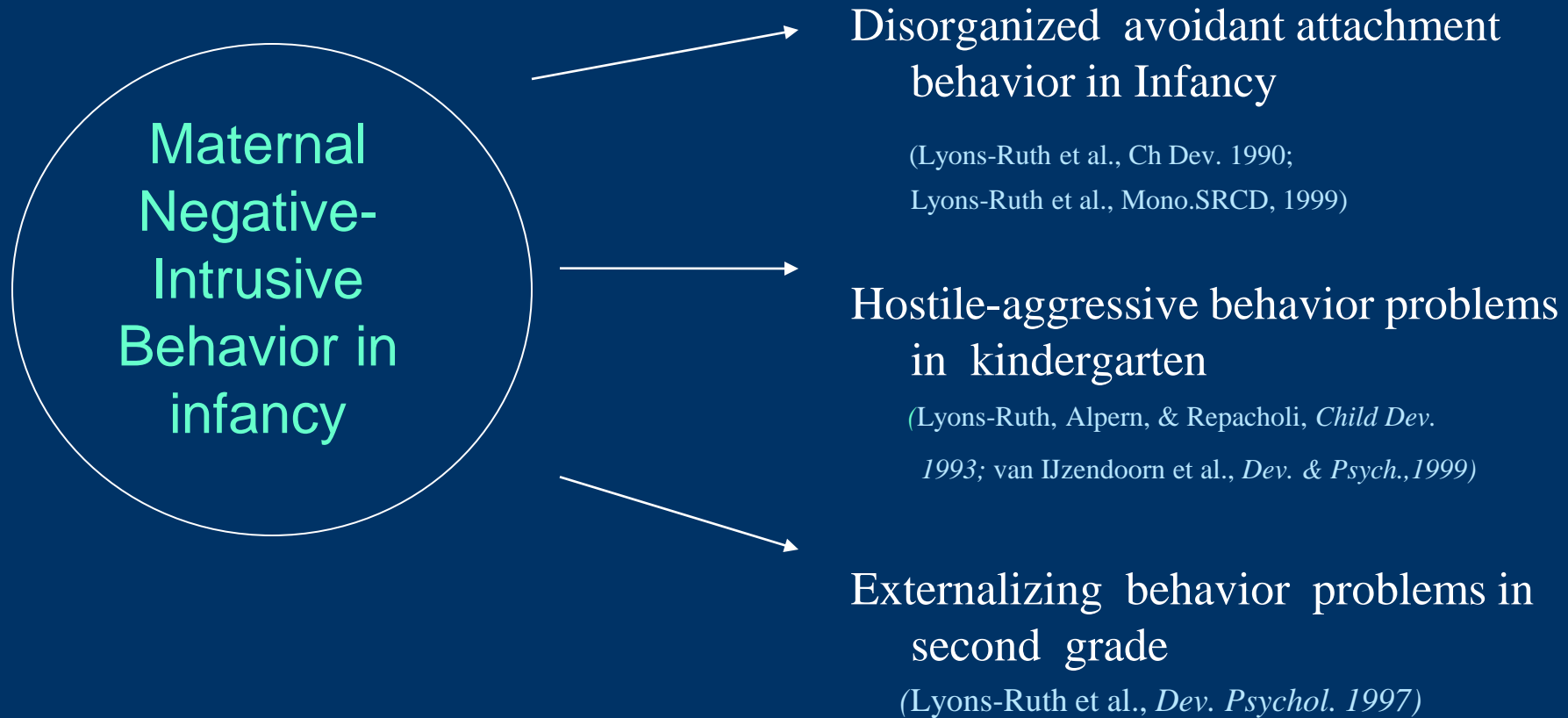
4. Disorientation

e.g. Shows confused, frightened, or odd affect with infant

5. Withdrawal

e.g. interacts from a distance; interacts silently; walks around infant.

Maternal Predictors of Outcomes from Infancy to Schoolage



Disorganized Avoidant Infant Behavior

18 months



Laboratory Observation: Maternal Disrupted Affective Communication (AMBIANCE coding system)

1. Negative-Intrusive Behavior

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2. Role Confusion

e.g. draws attention to self when infant is in need.

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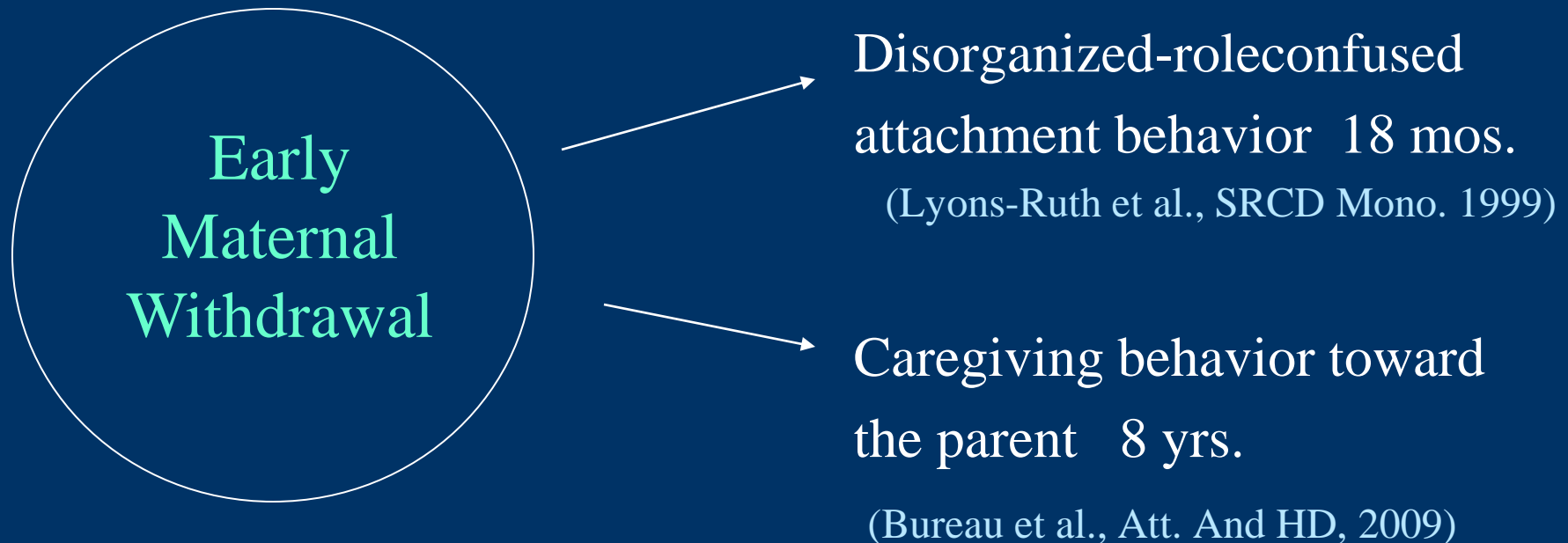
5. Withdrawal

e.g. interacts from a distance; interacts silently; walks around infant.

Withdrawing Profile

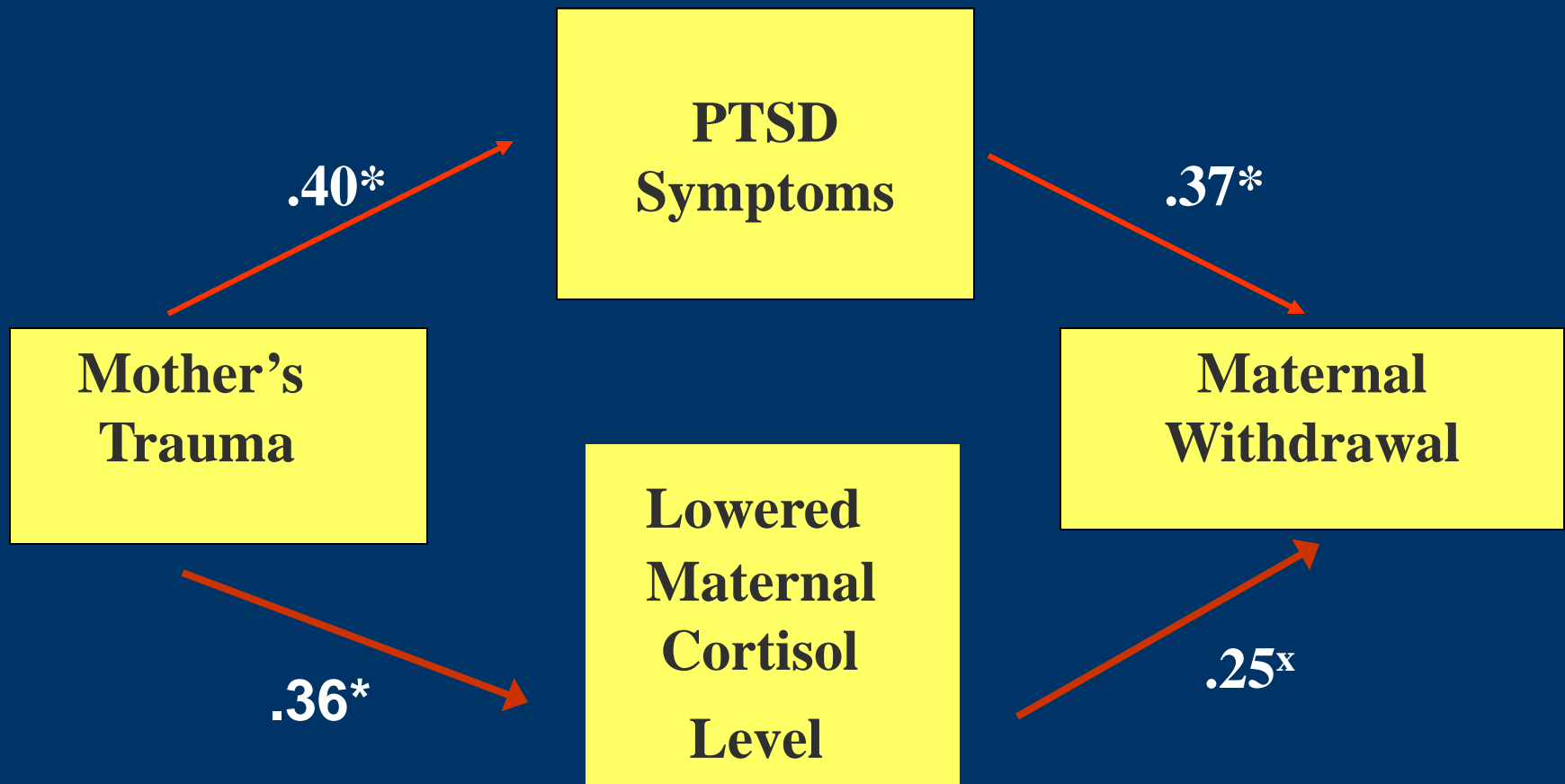
- A. Lack of parental initiative around attachment
(does not initiate greeting; comforting).
- B. Delayed responding
- C. Cursory responding
(‘hot potato’ pickup and putdown; moves away quickly).
- D. Directs infant away from self to toys.
- E. Distanced Interaction
(interacts from across the room).
- F. Little or no hostility or intrusion.

Maternal Withdrawal and Later Child Behavior? Age 8



Maternal Childhood Trauma, Lowered Cortisol, and Maternal Withdrawal (12-48 months)

Schechter et al., J. Trauma & Dissoc. 2008; Schechter et al., Psychiatry, 2010



Maternal Disrupted Communication and Maternal and Infant Cortisol Responses to Stress at 4 Months

Holmes , Crockett, Granger, Minnis, and Lyons-Ruth, 2012, under review

- **Participants:**
63 low-income Scottish mothers and their 4-month-old infants
 - **Still-face procedure:--done in home (not in lab)**
-

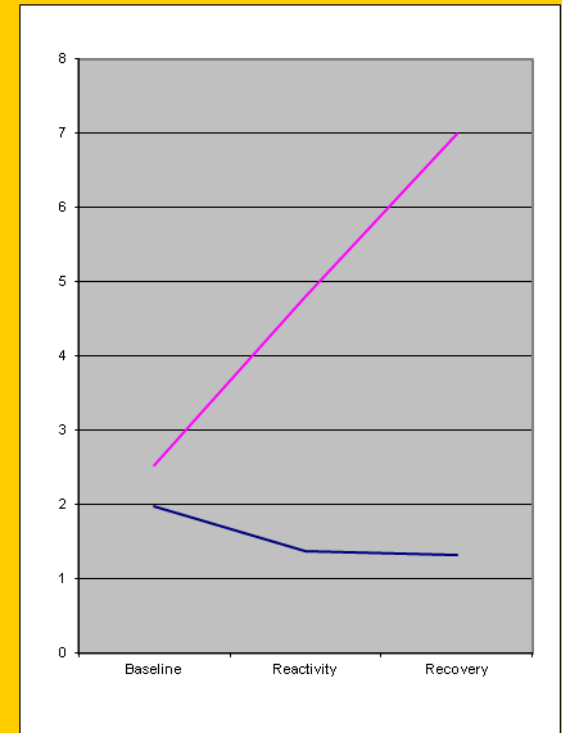
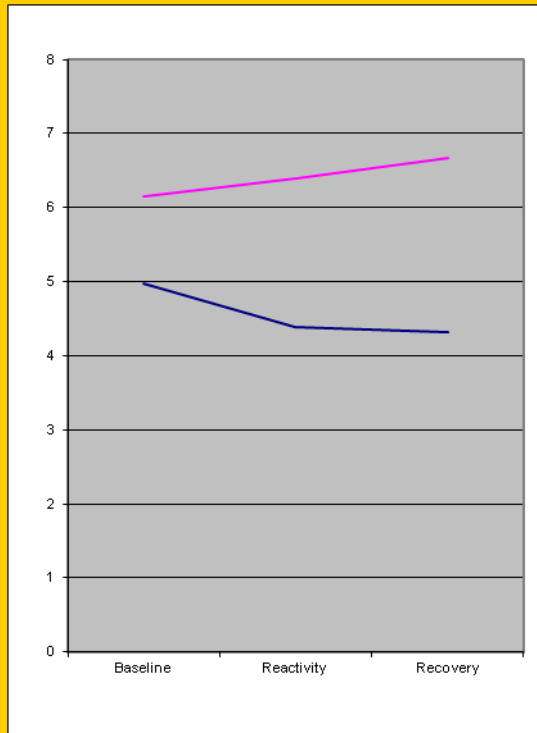
Maternal Disrupted Interaction and Maternal and Infant Cortisol Responses to Stress

Not Disrupted

Moderately Disrupted

Severely Disrupted

Nmol/L



N = 63

Infant Cortisol _____ Maternal Cortisol_____

Withdrawal :

- Disorganized approach behavior to the parent in infancy
- Later role confusion in interaction
- Maternal PTSD
- Maternal blunted cortisol response to child distress

Sequellae of early maternal withdrawal in young adulthood?

Borderline Personality Disorder

Central Features:

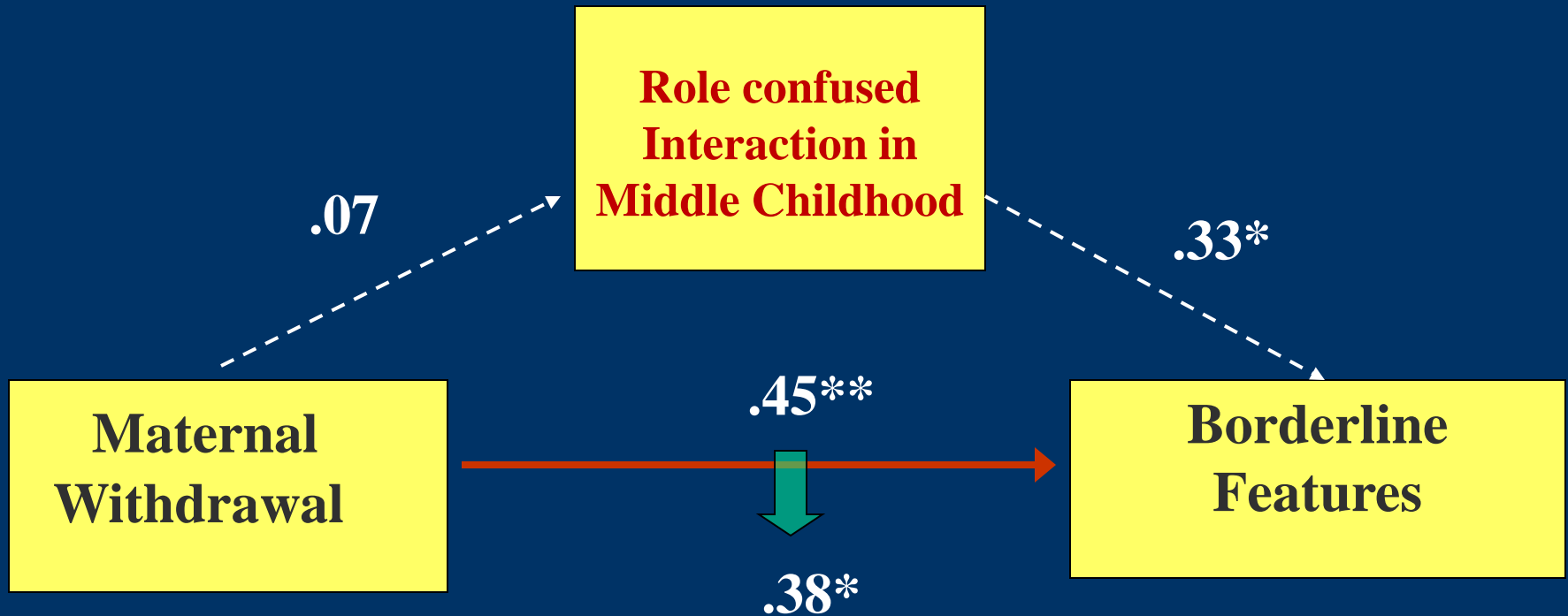
1. Two or more forms of impulsive self-damaging behavior
(e.g. substance abuse, sexual promiscuity, binge eating, reckless driving, spending)
 2. Recurrent suicidality or self-injury
 3. Intense, unstable relationships
-

Maternal Withdrawal Predicts a Broad Range of Psychiatric Symptoms on the SCID in Late Adolescence



Pechtel et al., IJCT, in press;
Shi et al., IMHJ, 2011;
Lyons-Ruth, et al. Psychiat. Res., in press

Does Disturbed Interaction in Middle Childhood Account for the Effect of Early Maternal Withdrawal on Borderline Features?

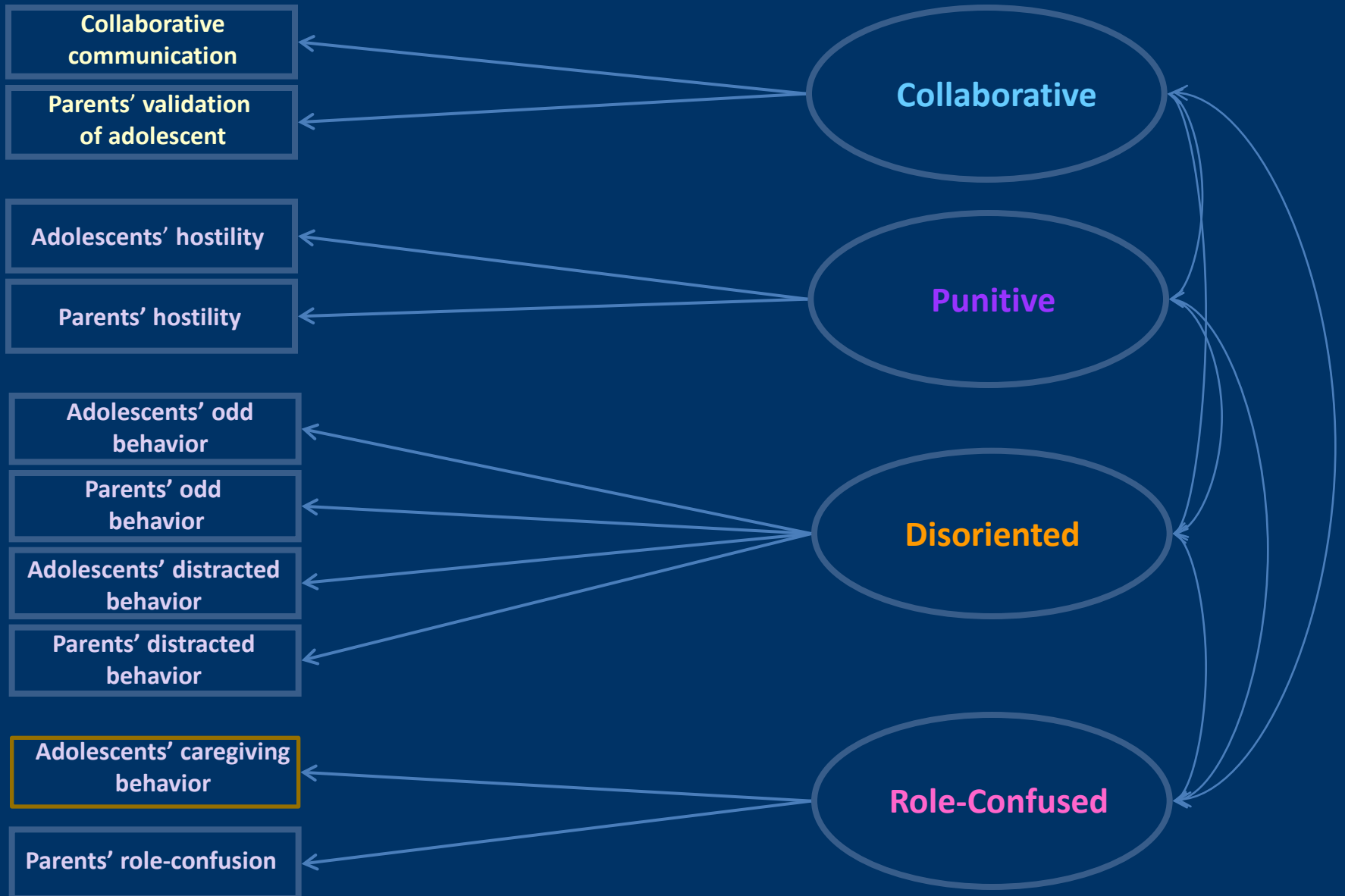


No mediation: Bootstrapping test for mediation not significant
(Same results for suicidality.)

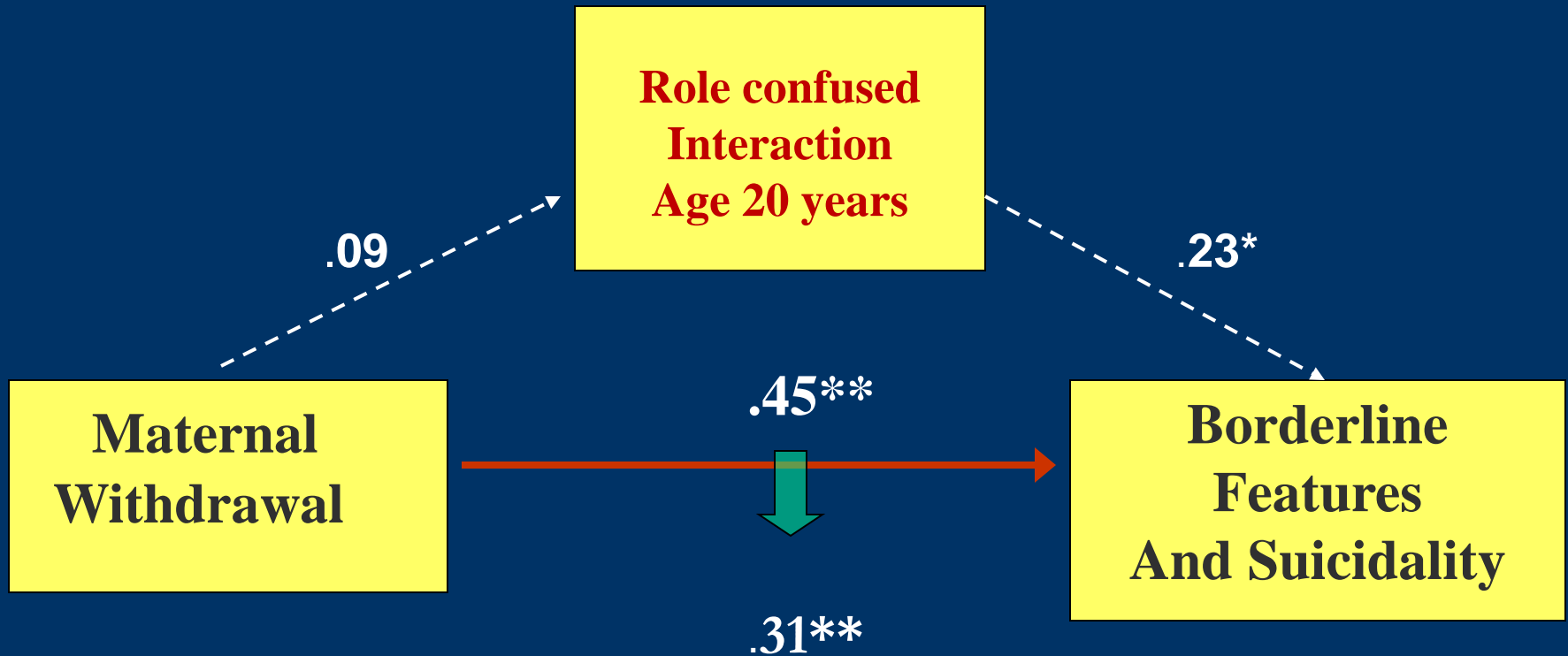
CFA Factor Structure – Young Adult Parent Interaction

$X^2(29) = 42.39, p = .062; RMSEA = .060; CFI = .969;$

Obsuth et al., under review



Does Disturbed Interaction in Young Adulthood Account for the Effect of Early Maternal Withdrawal on Borderline Features?



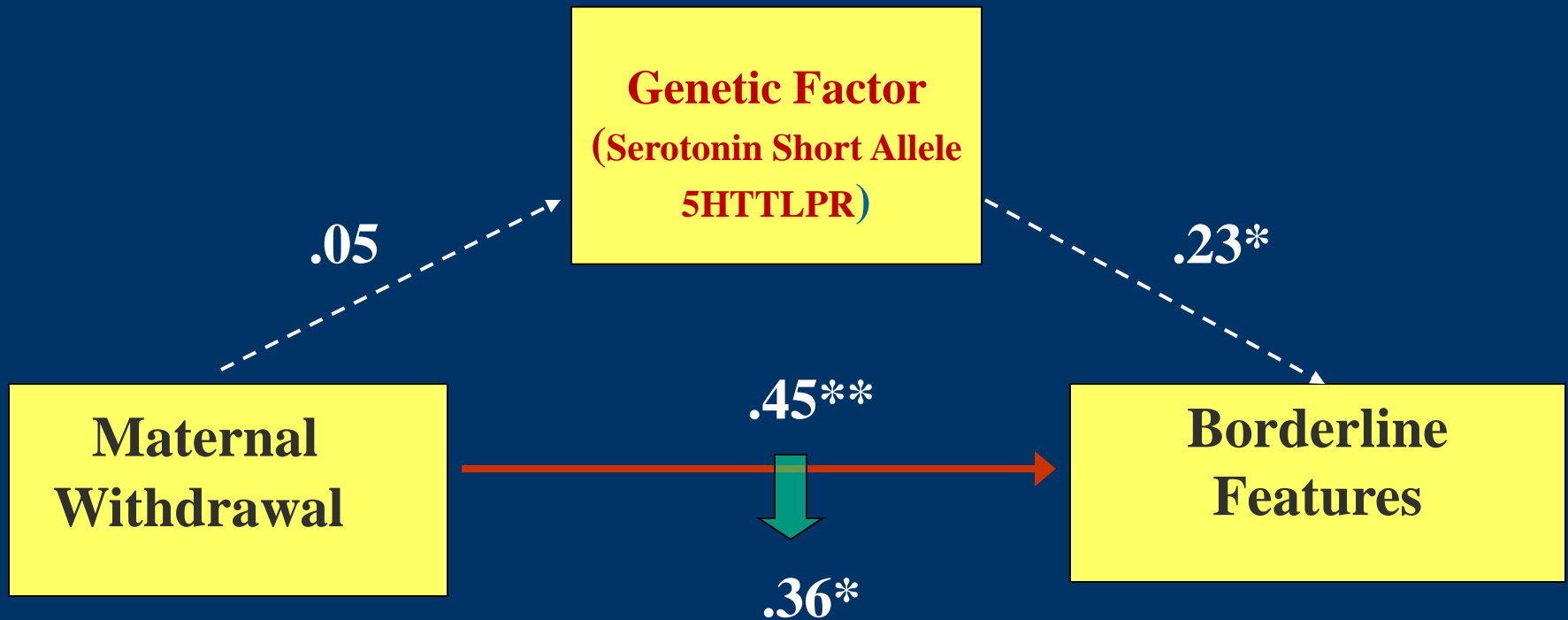
No mediation: Bootstrapping test for mediation not significant
(Same results for suicidality.)

Does Later Abuse Account for the Effect of Early Maternal Withdrawal on Borderline Features?



No mediation: Bootstrapping test for mediation not significant
(Same results for suicidality.)

Does Genetic Stress Vulnerability (Serotonin Short Allele) Account for the Effect of Early Maternal Withdrawal on Borderline Features?



No mediation: Bootstrapping test for mediation not significant
(Same results for suicidality.)

Implications...?

Against the Domino Model:

Infancy does not determine what happens later.

Controlling and disorganized behaviors continue to evolve and create additional risk into later adolescence.

Abuse and genetic factors contribute additional prediction.



Implications ...?

Enduring effects of regulation in infancy:

Early maternal withdrawal has an independent association with affect regulation into young adulthood.

- not explained by genetic stress vulnerability
- not explained by later trauma
- not explained by later quality of interaction in childhood
- not explained by later quality of interaction in young adulthood

Disinhibited Reactive Attachment Disorder

[Indiscriminate Attachment Behavior]

- Characterized by seeking contact and comfort from relative strangers
DSM-IV-R

- Related to duration of institutional rearing with rotating caregivers

O'Connor et al., 2000; 2003

- Related to extent of maternal psychosocial risk among home-reared infants, esp. psychiatric hx

Boris et al., 2004; Lyons-Ruth et al., 2009

Problematic Outcomes?

- Disruptive and hyperactive behavior by school entry among Romanian adoptees and home-reared at risk children. O'Connor et al., 2000; Lyons-Ruth et al., 2009
- Quasi-autistic features markedly elevated (6%) among severely deprived children adopted from Romania into Britain (e.g. intense stereotyped interests, difficulties in empathy, and lack of eye-to-eye contact).

Rutter, et al., J. Ch. Psychol. Psychiat., 1999.

Etiology: Neglect?

- Not related to cognitive delay in institutionally reared or home-reared infants

(Zeanah et al., 2005; O'Connor et al., 2000; Lyons-Ruth et al., 2009)

Quality of Caregiving and Indiscriminate Attachment?

Study 1. Infants at Socioeconomic Risk:

	β
Level of Maternal Disrupted Communication	.31*
Subtypes:	
Affective Communication Errors	.04
Role Boundary Confusion	.20
Disorientation	.41**
Intrusiveness/Negativity	.17
Withdrawal	.06

N = 64

Lyons-Ruth et al., Devel. & Psychopath., 2009

Quality of Caregiving and Indiscriminate Attachment ?

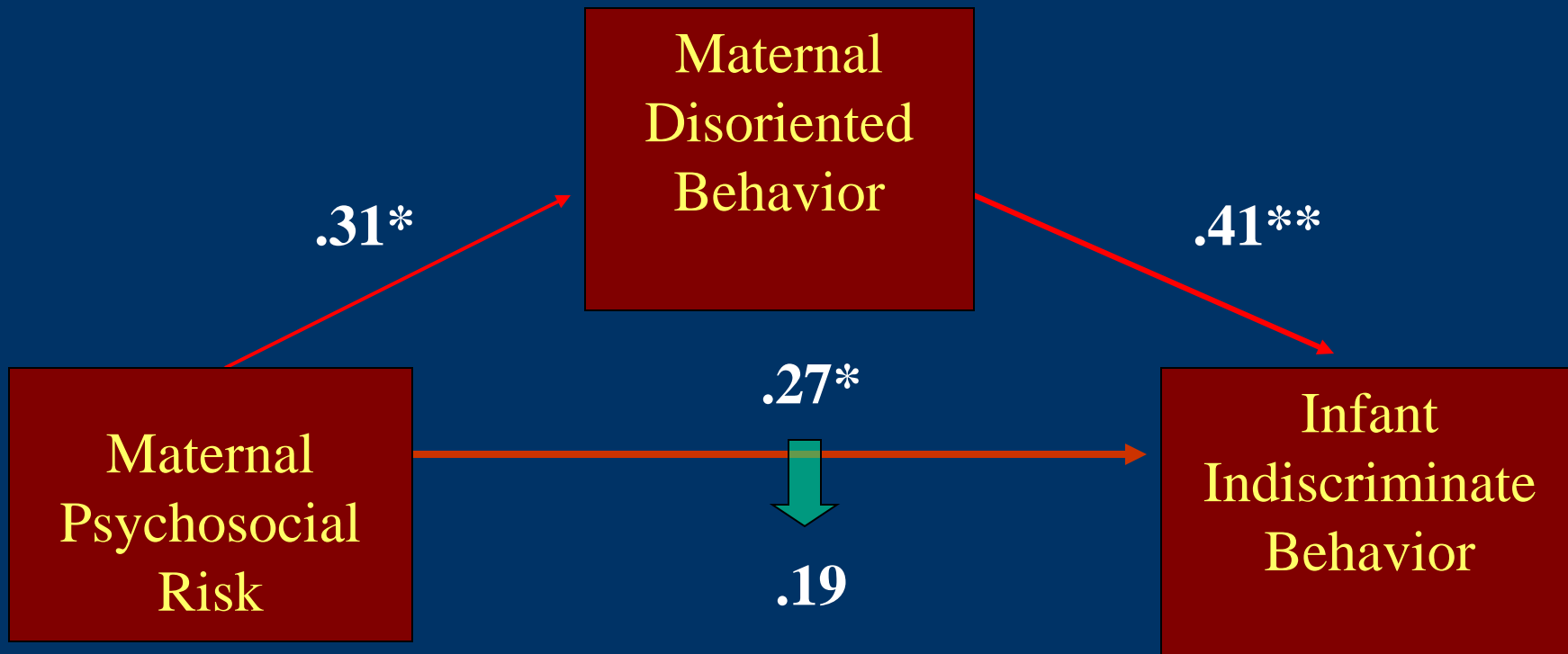
Study 2: Infants of High-Income Borderline Mothers and Controls

	Infant Indiscriminate Behavior
Level of Maternal Disrupted Communication	
Subtypes:	β
Affective communication errors	.08
Role confusion	.21
Disorientation	.39*
Intrusiveness/negativity	.12
Withdrawal	.23

(N = 32)

Lyons-Ruth, Hobson, et al., ICIS, Baltimore, 2010

Does Maternal Disoriented Behavior Account for the Relation between Maternal Psychosocial Risk and Infant Indiscriminate Behavior?



Yes: Significant Sobel (1982) test for mediation = 1.96, $p = .05$.

Etiology? Failures of Identification

- Rotating caregivers and disoriented mothers fail to provide the **consistent affective engagement** needed to constitute a basic attachment relationship aspects of human relatedness,
- Identification with the emotional attitudes of the caregiver.
- Ability to relate to and collaborate with others

Hobson, *The Cradle of Thought*, 2004

Neurobiological Correlates of Childhood Adversity

Diego Pizzagalli, McLean Hospital

Pia Pechtel & Martin Teicher McLean Hospital



Participants

16 Early Adversity (EA) (longitudinal)

- M=29.3 yrs

21 Healthy Controls

- M=23.4 yrs
- No history of abuse (Adverse Child. Exp.score of ≤ 1)
- No psychiatric diagnosis

Summary: MRI findings

Early child adversity related to:

- Reduced activation of left basal ganglia to cues signaling reward .

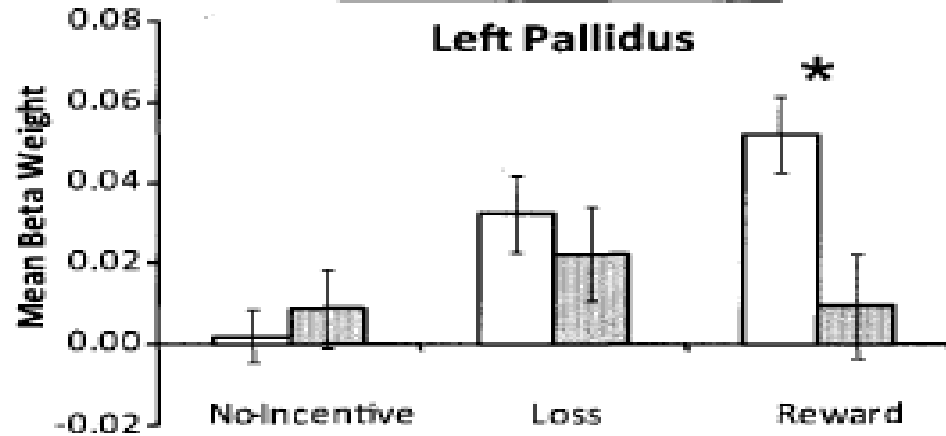
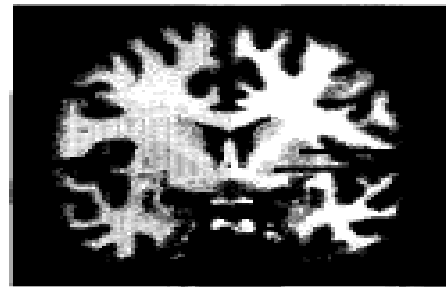
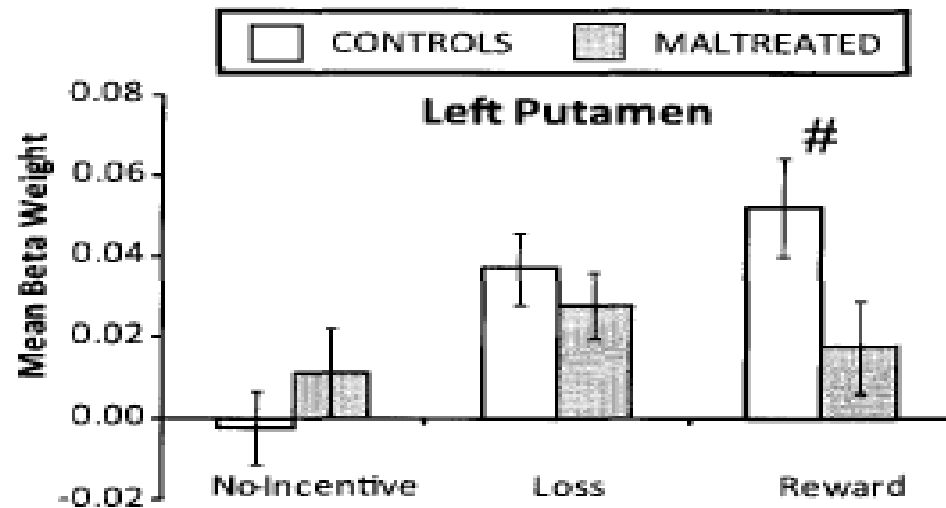
Dillon et al., *Biol. Psychiatry*, 2009

- Less grey matter volume and cortical thickness in OrbitoFrC.

Pechtel, Teicher, et al., in preparation

- Enlarged right amygdala volume.

Pechtel, Teicher, et al., in preparation



Volumetric Analysis

	Early Adversity vs Controls	Parental Bonding Instrument	Parent-Child Relationship Inventory	Symptom Questionnaire
Reduced OFC Grey Matter Volume	signif.	.60**	.54**	Dep. ns Anx. ns
Reduced OFC Average Cortical Thickness	signif.	.50**	.48**	Dep. ns Anx. ns

Transactional system:

Neurobiological development and Relational development

First three years

Basic neurobiological foundations for

- self-regulation,
- attachment and identification with other s
- early moral attitudes (empathy, shame, guilt)
- collaboration with others

emerge out of our relations with our caregiving environments.

Discussion

Last Thought...

A majority of the world's parents make secure attachment relationships with their infants.

(Meta-analysis, Van IJzendoorn et al., 1999)