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

Karlen Lyons-Ruth, Ph.D.

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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., Sci.ence, 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

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:**
Jean Francois Bureau, Ph.D., Post-Doctoral Fellow
Ann Easterbrooks, Ph.D., Professor, Tufts University

**Infancy Study:**
Elisa Bronfman, Ph.D.

**Genetics Collaborators:**
Judit Gervai, Ph.D., Hungarian Academy of Sciences
Maria Sasvari-Szekely, M.D., Semmelweis University
David Pauls, Ph.D., Harvard Medical School

**MRI Collaborators:**
Diego Pizzazgalli, Ph.D., McLean Hospital
Martin Teicher, M.D., Mclean Hospital
Pia Pechtel, Ph.D., McLean Hospital

**Funding Sources:**
- National Institute of Mental Health, R01MH062030
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- 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

Deactivating Strategy:
Low Distress
Low Contact-Seeking

Open Communication Strategy:
Flexible use of Distress
Flexible use of Contact-Seeking

Hyperactivating Strategy:
High Distress
High Contact-seeking
Higher anger

Insecure
Ambivalent

• 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 stilling
   - 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

Main & Solomon, 1990
### Family Risk Factors and Incidence of Disorganized Attachment Strategies in Infancy

<table>
<thead>
<tr>
<th>Group</th>
<th>Incidence</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle-income low-risk group</td>
<td>13%</td>
<td>(Main &amp; Weston, 1981)</td>
</tr>
<tr>
<td>Middle-income low-risk group</td>
<td>19%</td>
<td>(DeMulder &amp; Radke-Yarrow, 1991)</td>
</tr>
<tr>
<td>Low-income control group</td>
<td>18%</td>
<td>(Carlson et al., 1989)</td>
</tr>
<tr>
<td>Middle-income depressed group</td>
<td>25%</td>
<td>(DeMulder &amp; Radke-Yarrow, 1991)</td>
</tr>
<tr>
<td>Low-income control group</td>
<td>32%</td>
<td>(Lyons-Ruth et al., 1990)</td>
</tr>
<tr>
<td>Middle-income alcohol intake</td>
<td>35%</td>
<td>(O’Connor et al., 1987)</td>
</tr>
<tr>
<td>Middle-income depressed group</td>
<td>40%</td>
<td>(Teti et al., 1995)</td>
</tr>
<tr>
<td>Middle-income bipolar disorder</td>
<td>50%</td>
<td>(DeMulder &amp; Radke-Yarrow, 1991)</td>
</tr>
<tr>
<td>Low-income depressed group</td>
<td>62%</td>
<td>(Lyons-Ruth et al., 1990)</td>
</tr>
<tr>
<td>Low-income maltreating group</td>
<td>82%</td>
<td>(Carlson et al., 1989)</td>
</tr>
</tbody>
</table>
Disorganization related to elevated cortisol after mild stressors

Spangler & Grossmann, 1993; Hertsgaard et al., 1995
Parental Sensitivity and Infant Disorganization?

Metaanalysis:

- 13 studies (N = 1951)
- Effect size small:
  \[ r = .10 \quad ** \]

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
  \[ r = .35 \text{ ***} \ (N = 384; \ 6 \text{ studies}) \]

  Good stability for periods up to 5 years
  \[ r = .56\text{ ***} \ (N = 203; \ 4 \text{ studies}) \]

  Metaanalysis: Madigan et al., Attachment & Human Development, 2006
Laboratory Observation:
Maternal Disrupted Affective Communication
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Maternal Predictors of Outcomes from Infancy to Schoolage

Maternal Negative-Intrusive Behavior in infancy

Disorganized avoidant attachment behavior in Infancy
(Lyons-Ruth et al., Ch Dev. 1990; Lyons-Ruth et al., Mono.SRCD, 1999)

Hostile-aggressive behavior problems in kindergarten
(Lyons-Ruth, Alpern, & Repacholi, Child Dev. 1993; van IJzendoorn et al., Dev. & Psych., 1999)

Externalizing behavior problems in second grade
(Lyons-Ruth et al., Dev. Psychol. 1997)
Disorganized Avoidant Infant Behavior

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

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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

Early Maternal Withdrawal

Disorganized-roleconfused attachment behavior 18 mos.
(Lyons-Ruth et al., SRCD Mono. 1999)

Caregiving behavior toward the parent 8 yrs.
(Bureau et al., Att. And HD, 2009)
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

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

Early Maternal Withdrawal

- Extent of Borderline Features
- Recurrent Suicidality
- Substance Abuse (0.49**)
- Conduct Symptoms (0.40*)
- Eating Disorders (0.34*)
- Antisocial Personality Disorder

Pechtel et al., IJCT, in press;
Shi et al., IMHJ, 2011;
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

\[ X^2 (29) = 42.39, p = .062; \text{RMSEA} = .060; \text{CFI} = .969; \]

Obsuth et al., under review
Does Disturbed Interaction in Young Adulthood Account for the Effect of Early Maternal Withdrawal on Borderline Features?

Maternal Withdrawal → Role confused Interaction Age 20 years → Borderline Features And Suicidality

- 0.09
- 0.45**
- 0.31**
- 0.23*

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?

Childhood Abuse

Maternal Withdrawal → Borderline Features

- Maternal Withdrawal → Childhood Abuse: .20
- Childhood Abuse → Borderline Features: .45**
- Maternal Withdrawal → Borderline Features: .33**
- Childhood Abuse → Borderline Features: .39*

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).

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:

\[ \beta \]

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

<table>
<thead>
<tr>
<th></th>
<th>Early Adversity vs Controls</th>
<th>Parental Bonding Instrument</th>
<th>Parent-Child Relationship Inventory</th>
<th>Symptom Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced OFC Grey Matter Volume</td>
<td>signif.</td>
<td>.60**</td>
<td>.54**</td>
<td>Dep. ns Anx. ns</td>
</tr>
<tr>
<td>Reduced OFC Average Cortical Thickness</td>
<td>signif.</td>
<td>.50**</td>
<td>.48**</td>
<td>Dep. ns Anx. ns</td>
</tr>
</tbody>
</table>
Transactional system:
Neurobiological development and Relational development

First three years
Basic neurobiological foundations for
- self-regulation,
- attachment and identification with others
- early moral attitudes (empathy, shame, guilt)
- collaboration with others
emerge out of our relations with our caregiving environments.
Discussion
A majority of the world’s parents make secure attachment relationships with their infants.

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