**Intervening to Enhance Parenting of Vulnerable Infants: Attachment and Biobehavioral Catch-up**

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**Human infant**

- Biologically prepared to depend on caregivers
- Parents function as co-regulators

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**Failures in this caregiving system**

Inadequate care, maltreatment, disruptions in caregiving
Challenges among children who have experienced different types of adversity

- Attachment
- Biological regulation
  - Risk for problems regulating hormone production
  - Risk for problems regulating ANS activity
- Executive functioning
  - Risk for problems with development of range of executive functions

Attachment and Biobehavioral Catch-up (ABC)

- Designed to enhance parenting
  - Neglecting birth parents of infants
  - Foster parents of infants
  - Parents adopting children after institutional care

Randomized clinical trials conducted with each of these groups

  Mothers with opioid dependence

Attachment and Biobehavioral Catch-up (ABC)

- 10-session intervention
- Targets key issues identified as problematic for children who have experienced early adversity
- Implemented in home
Nurturance especially important for young children who have experienced adversity

- Difficult to organize attachment behaviors without nurturing parent
- Dozier et al., 2001

Two things can get in the way
- Children may push away
- Nurturance does not come naturally to some parents
Contingency analyses reveal that parents respond “in kind”

Stovall-McClough & Dozier, 2004

First target for intervention:
Provide nurturance even when child does not elicit it

This child needs you even though she may not appear to need you

Characteristic ways parents may be non-nurturing

- Exactly! I told you! (fussing)
- You’re ok. You’re not hurt. (dismissing)
- It’s not broken. (making fun of child)
- You’re a big boy.
- Look outside. There’s a butterfly! (distraction)
- Ignore

All of these – giving child message that he or she shouldn’t bring distress to parent
How intervention is implemented

- Manualized content
  - Present videos of other parents and of themselves
  - Present evidence supporting importance of nurturing care
  - In-the-moment comments

ABC intervention sessions

Manualized content

Sessions 1-2: Providing nurturance
Sessions 3-4: Following child’s lead
Sessions 5-6: Avoiding intrusive and harsh behavior
Sessions 7-8: Over-riding “voices from the past”
Sessions 9-10: Consolidating
Comments can have 1-3 components

1. Description of parent behavior
   “He’s crying and you’re holding him”

2. Link parent behavior to intervention target
   “Good job nurturing him”

3. Link parent behavior to child outcome
   “That lets him know you’re there for him”

Coding 5 minute clip

<table>
<thead>
<tr>
<th>Targets (Parent Behavior &amp; Coach Comments)</th>
<th>No. Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = Follows the lead</td>
<td>0 = 0 components</td>
</tr>
<tr>
<td>2 = Does not follow the lead</td>
<td>1 = 1 component</td>
</tr>
<tr>
<td>3 = Delights in child</td>
<td>2 = 2 components</td>
</tr>
<tr>
<td>4 = Follows the Lead with Delight</td>
<td>3 = 3 components</td>
</tr>
<tr>
<td>5 = Nurture</td>
<td></td>
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<tr>
<td>6 = Does not nurture</td>
<td></td>
</tr>
<tr>
<td>7 = Behaves in frightening way</td>
<td></td>
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<tr>
<td>8 = Off-Target Comment</td>
<td></td>
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<tr>
<td>0 = No Comment</td>
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</tbody>
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Enhanced Parenting

- ABC Intervention
  
- In the Moment Comments
  
- Follow child’s lead
  
- Avoid frightening behavior
  
- Behavioral regulation
  
- Biological regulation

Targets of intervention
Biological dysregulation

Early adversity leads to biological dysregulation

Non-human and rodent (as well as human) studies have shown effects of early experience on HPA axis (e.g., Coe et al., 1985; Levine et al., 1983)

HPA axis

H - Hypothalamus
P - Pituitary
A - Adrenal

Cortisol an end product
Sensitive to effects of early experience

HPA axis: 2 orthogonal functions

- Stress reactive function
  - Body’s mounting a stress response

- Diurnal function
  - Organism functioning as diurnal (or nocturnal) creature
When we measure cortisol

![Graph of cortisol levels throughout the day]

Early adversity and diurnal cortisol

![Graph comparing cortisol levels between Low-risk, Foster, and Neglected groups]

Bernard et al., 2010, *Archives Ped Adol Med*

Dysregulation

- Biological dysregulation: cortisol
- Behavioral dysregulation:
  - Behavior problems
  - Inhibitory control
Parents who follow child’s lead have children with better self-regulation (Raver, 1996)

Following the lead – what it is

Characteristic ways parents may follow the lead

- Follow child’s behavior or vocalization
- Comment on what child is doing
- Smooth interactions that are regulating
Characteristic ways parents may not follow the lead

- Intrusive behaviors (e.g., messing with her head)
- Take control
- Correct child
  - Teachy ("what color is it?")
  - Bossy ("no, that's not how you do it")
- Ignore child
- Interactions are jarring, dysregulating
  - As children get older, these interactions don’t hold attention

ABC intervention sessions

Manualized content

Sessions 1-2: Providing nurturance

Sessions 3-4: Following child’s lead

Sessions 5-6: Avoiding intrusive and harsh behavior

Sessions 7-8: Over-riding "voices from the past"

Sessions 9-10: Consolidating

Comments can have 1-3 components

1. Description of parent behavior
   "Like her reaching out and your giving it to her"

2. Link parent behavior to intervention target
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3. Link parent behavior to child outcome
   "That’s going to make her feel important and like she can have an effect on things around her"
In the Moment: fidelity coding

<table>
<thead>
<tr>
<th>Code</th>
<th>Date coded</th>
<th>Coach First &amp; Last Name</th>
<th>Code's Organization</th>
<th>Case</th>
<th>Session</th>
<th>Time coded</th>
</tr>
</thead>
</table>

### Targets of intervention

- Enhanced Parenting
  - Nurture
  - Follow child's lead
  - Avoid frightening behavior

- Attachment quality
  - Early self-regulation

### Frightening behavior

- Harsh, frightening, and/or intrusive behavior
  - Undermines child’s ability to regulate behavior and biology

  e.g., Bernard et al., 2010; Lyons-Ruth et al., 1993; Madigan et al., 2016
ABC intervention sessions

Manualized content

Sessions 1-2: Providing nurturance
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Assessing effectiveness

Randomly assigned children and parents to Attachment and Biobehavioral Catch-up (ABC) or to an alternate intervention (DEF)

Focus here on outcomes for neglected/CPS-involved sample (n=120)

Children birth-24 months at start of intervention

DEF (Developmental Education for Families)

Control intervention focused on cognitive and motor development

Structure same as for ABC
10 weekly sessions in home
### Intervention effects on child attachment security

- Assessed in Strange Situation
- Parents involved in child welfare system
- N=120

<table>
<thead>
<tr>
<th>Secure</th>
<th>Insecure</th>
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Bernard, Dozier et al., *Child Development*, 2012

### Intervention effects on diurnal cortisol production

- Assessed at wake-up and bedtime post-intervention over 3 days
- N=120
Early adversity and diurnal cortisol

![Graph showing early adversity and diurnal cortisol](image)

Bernard, Butzin-Dozier, Rittenhouse, & Dozier, 2010

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Intervention effects on diurnal cortisol 1 month post-intervention

![Graph showing intervention effects on diurnal cortisol](image)

Bernard, Dozier, et al., 2015, *Development and Psychopathology*

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Intervention effects on diurnal cortisol 3 years post-intervention

![Graph showing intervention effects on diurnal cortisol](image)

Bernard, Hostinar, & Dozier, 2015, *JAMA - Peds*
Inhibitory control

- Inhibitory control is key to success in school
  (Blair et al., 2007; Kochanska et al., 1994; Mischel et al., 1972)
  - Doing what one is supposed to do
  - Inhibiting prepotent response

Assessment of inhibitory control

- Put attractive toys in front of child
- Tell him or her not to play with them, instead play with crayons (boring in this context)

Intervention effects on inhibitory control

Lind, et al., 2017
Child brain activation (assessed through fMRI)

- Study differences in brain functioning among children
- N=75 (25 ABC, 25 DEF, 25 low-risk)
- In collaboration with Nim Tottenham

Attention to threat task

Push button when you see butterfly

Attention to threat task

- Fear faces (High Risk minus Low Risk)
  - High risk (ABC + control) greater activation of occipital cortices and fusiform gyrus than low risk
  - High Risk → greater attention to threat
Fear faces (ABC minus DEF)

- ABC children had greater activation in
  - R orbitofrontal cortex
  - R Insular cortex
  - Anterior cingulate cortex
  than control children while viewing fear faces

ABC → greater regulation to threat

ABC affects targets and outcomes (assessed through RCTs)

- Child:
  - Attachment
  - Cortisol production (immediate and 3 years post-intervention)
  - DNA Methylation (whole genome analyses Hoye and Roth)
  - Language development (2 years post-intervention) (Raby)
  - Emotion expression (2 years post-intervention) (Lind)
  - Executive functioning (3 years post-intervention)
    - Inhibitory control (Lind)
    - Set-shifting (Lewis-Morrarty)
  - Security (8 years post-intervention) (Zajac)
  - Neural activity/EEG (8 years post-intervention (Bick)
  - Brain activation/fMRI (8 years post-intervention (Valadez & Tottenham)
  - ANS regulation (9 years old) (Tabachnick)

Intervention effects on parental sensitivity

- Parents who received ABC more sensitive and less intrusive (assessed behaviorally) at post-intervention than DEF parents
  
  - These gains sustained 3 years later
    Bick & Dozier, 2013; Raby et al. in prep; Yarger et al., 2016
Intervention effects on parental neural activity

- Neural activity of neglecting mothers indicated failure to discriminate faces (Rodrigo et al., 2011)

Intervention effects on mothers’ neural activity 3 years post-intervention

- Looked at through event related potentials (ERPs)
- Compared 3 groups:
  - Low-risk comparison
  - DEF (high-risk control)
  - ABC (high-risk experimental)

Kristin Bernard dissertation

Bernard et al., 2015, Child Development

Results - N170

- Low-risk comparison group

Bernard, Simons, & Duizet, 2015, Child Development
Results - N170

- DEF (High-risk control group)

\[
\begin{array}{c}
\text{Crying} \\
\text{Laughing} \\
\text{Neutral}
\end{array}
\]

Results - N170

- ABC

\[
\begin{array}{c}
\text{Crying} \\
\text{Neutral} \\
\text{Laughing}
\end{array}
\]

ABC affects targets and outcomes (assessed through RCTs)

- Parent:
  - Sensitivity (3 years post-intervention)
  - Neural activity/ERP (3 years post-intervention) (Bernard)
  - Attachment script knowledge (Raby)

- Child:
  - Attachment
  - Cortisol production (immediate and 3 years post-intervention)
  - DNA Methylation (whole genome analyses Hoye and Roth)
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 Mothers who are dependent on opioids

- At risk for not being sensitive, responsive caregivers
  - Opioids interfere with rewarding nature of caregiving
  - May be overwhelmed, preoccupied

 Infants of mothers who are dependent on opioids

- Dysregulated behaviorally and biologically
- Hard to soothe

 What is needed

- Sensitive, responsive care
  - Nurturance when distressed
  - Sensitive, contingent responsiveness
  - Protection from over-stimulation
- But that's challenging
Modified ABC for mothers who are opioid dependent

- Starts prenatally (instead of at infant age of 6 months)
  - Practice/comments with infant simulator prenatally

- Sessions spread out
  - 1 pre-natal session, 11 postnatal starting at birth

Strategy

- Keep ABC targets central
  - (still about nurturing and following lead while supporting these additional components)

- Make comments in the moment even in prenatal visits

Randomized clinical trial of mABC under way

- Expect to enhance:
  - Maternal sensitivity
  - Infant self-regulation (attachment, cortisol production, autonomic nervous system)

- Can we change how rewarding infant is relative to drugs?
  - Examining though maternal neural activity and substance use
As a field, dismal results

Few interventions implemented with adequate fidelity to model (Santa Ana, et al., 2008)

Central to the intervention

In-the-moment commenting predicts change in parenting

- In-the-moment commenting predicts parenting behavior
  - Higher frequency of on-target comments
  - More components included in comments
  - Greater increases in parent following lead and greater decreases in intrusiveness

Caron et al., 2016
Alignment of screening, training, supervision, fidelity monitoring (with regard to active ingredient)

- Screening
- Training
  - Introduce on day 1 of training
- Supervision
  - 30 minutes of supervision on in-the-moment comments weekly for 1 year
  - 60 minutes of clinical supervision
- Certification
  - Must meet criteria (e.g., 1 comment per minute, at least 1 component per comment, etc.)

Pre- and post-intervention parenting behaviors in community (n=315, 18 sites, 36 parent coaches)

Disseminating

- 20 states, 8 countries
Grant support

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Edna Bennett Pierce