

The importance of responsive parenting for vulnerable infants

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Abstract

The quality of the early caregiving context sets the stage for the developing child's long term developmental trajectory. Infants are born highly dependent on parents and other caregivers for critical input for developing brain and behavioral systems. When infants experience early adversity, they are at risk for difficulties regulating behavior, emotions, and physiology. Parenting interventions have been developed to enhance parental responsiveness, thereby enhancing child outcomes. One such program, Attachment and Biobehavioral Catch-up (ABC), is a home visiting intervention designed to enhance parenting nurturance and sensitivity. In this paper, we will consider the importance of parental sensitivity and developmental consequences of sensitive and insensitive care. We will then describe interventions that target parental responsiveness and intervention effectiveness, focusing primarily on ABC. Public policy recommendations related to the importance of parental responsiveness will then be discussed.

Human infants are born highly dependent on parents for help in regulating physiology, behavior, and emotions (Hofer, 2010; Hostinar, Sullivan, & Gunnar, 2014). Sensitive, responsive parenting builds the foundation for secure and organized attachments and healthy self-regulatory capabilities (Raby, Roisman, Fraley, & Simpson, 2015; Sroufe, Egeland, Carlson, & Collins, 2005). Early adversity undermines the development of the rapidly changing brain and self-regulatory capabilities of the infant (Callaghan & Tottenham, 2016a, 2016b; Greenough, Black, & Wallace, 1987). When infants experience early adversity, they especially need responsive care, helping them recover from the dysregulating effects of the adversity. Various parenting programs have been developed that aim at helping parents develop skills in responding sensitively to their young infants (Dozier & Bernard, 2019; Juffer, Bakermans-Kranenburg, & van IJzendoorn, 2017). In this paper, we provide an overview of the literature that highlights the importance of early intervention, and discuss prevention approaches and policy recommendations.



1. The importance of early experience

Tottenham (2019) described the human infant as having a neotenuous brain because the timeline for brain development is so protracted, especially for the prefrontal cortex (PFC) and connections between the PFC and other brain regions. The “co-construction” (Tottenham, 2019, p. 350) of a complex brain structure is allowed by a protracted period of dependence on the caregiver. The quality of input from the environment, most especially in terms of caregiver interactions, is therefore central.

1.1 The role of sensitive parenting in providing input to the developing brain

Co-construction of the developing brain occurs as the result of critical input provided by parents and other caregivers. Parents who respond to infant cues, for example, by widening eyes in response to infant's wide eyes or opening mouth in response to the infant's widening mouth, are providing sensitive, responsive input that serves as the basis for early brain connections. The developing brain makes connections initially between neurons in simple circuits and over time between brain regions in complex circuits (Belsky & de Haan, 2011; Tottenham, 2012). Functioning analogously to a well-traveled garden path, these circuits become efficient over time. Equally important, unused neurons die and unused connections or synapses are pruned, leading to increased efficiency of functioning circuits.

During the first 2 years of life, the brain doubles in size (Li et al., 2019; Stiles & Jernigan, 2010) and is highly sensitive to the quality of caregiving (Fox, Levitt, & Nelson, 2010). Sensitive parenting behaviors scaffold the optimal development of the increasingly complex human connectome by sculpting a brain for improved self-regulation and social-emotional functioning (Callaghan & Tottenham, 2016a, 2016b).

But, what if parents fail to provide adequate input to children, or provide problematic input? The most extreme conditions of neglect are seen in institutional settings (e.g., Nelson et al., 2007). Although orphanages vary in quality, the most problematic are characterized by high infant to staff ratios and little interaction between infants, with changing caregivers working shifts (van IJzendoorn et al., 2020). In addition to the problematic ratio, a priority is usually placed on caring for physical needs according to an established schedule, rather than responding to infants' cues (van IJzendoorn et al., 2020). Sometimes sheets or dividers are put up between infant cots to reduce interactions between children, further reducing sensory input. Nelson et al. (2007) argue that these conditions of social deprivation fall outside the infant's expected environment. That is, infants would not have survived under such conditions in most cases in our evolutionary history, and therefore have not evolved strategies for coping effectively with them. Indeed, such conditions have the most adverse effects on the developing brain, with effects ranging from stunted physical growth, cognitive delays, to problems regulating attention (van IJzendoorn et al., 2020).

Insensitive, inconsistent, and/or frightening care also has consequences for infants and young children, but for the most part, not to the extreme caused by institutional care. Nonetheless, neglect, when parents fail to meet

infants' basic needs for responsiveness, and abuse, when parents behave in frightening ways to children or fail to protect from threat, have consequences. Returning to the garden path metaphor, one can imagine that very different pathways would be made, or circuits strengthened and weakened through use, for a child with a neglecting or maltreating caregiver than for a child with a responsive parent.

Early caregiving adversity disrupts the structural and functional development of the rapidly growing brain (Callaghan & Tottenham, 2016b), leading to altered fronto-limbic functional connectivity (Gee et al., 2013; Herringa et al., 2013), reduced neuroplasticity (Callaghan & Tottenham, 2016a), and widespread cortical and subcortical gray matter alterations (De Brito et al., 2013; Mehta et al., 2009; Tozzi et al., 2020). Such neural changes have been linked to increased vulnerability to psychopathology, such as anxiety and depression across the lifespan (Busso et al., 2017; Callaghan & Tottenham, 2016a, 2016b).

1.2 The role of sensitive parenting in buffering the developing infant

The effective parent not only provides critical stimulation to the developing brain, but also buffers from threat and from over-stimulation. The parent can be seen as a “gate” to stimuli, with the infant protected from being impinged upon in ways that the immature and developing regulatory systems cannot yet effectively gate out. A good example is seen in the parent's ability to serve as a buffer to the infant's neuroendocrine reaction to stress. The hypothalamic-pituitary-adrenal (HPA) axis is part of the body's adaptive hormonal response system to stress. When an experience is perceived as threatening, the HPA axis initiates a sequence of hormonal responses, starting with corticotropin-releasing hormone (CRH) release into the bloodstream by the hypothalamus. CRH then signals to the pituitary to release adrenocorticotrophic hormone (ACTH), which in turn signals to the adrenal cortex to release glucocorticoids (cortisol in humans and other mammals). Glucocorticoids represent the end product of the HPA axis, which then, through negative feedback, signal to the hypothalamus and pituitary to stop producing CRH and ACTH.

By the time infants are 3 months old, their cortisol response is dampened when they are challenged, for example, by a heel stick or separations from parents, even though they show strong behavioral reactions—if they have trusted caregivers (Larson, White, Cochran, Donzella, & Gunnar, 1998).

This lack of a cortisol response makes a great deal of sense when considering there is no need for the infant to mobilize resources because the infant is incapable of effective behavioral responses for the threat (e.g., running, fighting, etc.). The effective parent buffers the infant from mounting a cortisol response, thereby averting the high levels of circulating glucocorticoids that could otherwise damage the developing brain.

Whereas the sensitive parent serves to buffer the infant from threat, the insensitive parent does not. The parent may fail to protect the infant from overwhelming stimuli, or may him or herself overwhelm the infant through intrusive or even frightening behaviors. Consequences of this failure to buffer the infant can be seen in the infant's production of cortisol under stressful conditions, possibly resulting in high levels of circulating glucocorticoids. Evidence of high levels of circulating glucocorticoids is mostly speculative among human infants, but such effects have been observed among nonhuman species (e.g., [Hesen et al., 1996](#)).

Among humans, the effects of adversity have been seen in perturbation to the diurnal pattern of cortisol production ([Bernard, Butzin-Dozier, Rittenhouse, & Dozier, 2010](#)). Maintaining a day-night pattern is one of the several functions of the HPA axis. From the first several months of life, human infants show a pattern of cortisol production with high levels in the morning, peaking about 30 min post-wake-up and then declining quickly with a gradual decline through the day to a nadir at bedtime ([Larson et al., 1998](#)). The high levels of cortisol in the morning and low levels in the evening support a diurnal cycle, such that the (human) organism has more energy in the morning and less in the evening, supporting wakefulness in the daytime and sleep at night. Nocturnal creatures show the inverse of this pattern.

Infants who have experienced adversity show flatter patterns of cortisol production across the day than infants who have not experienced adversity. As can be seen in [Fig. 1](#) ([Bernard et al., 2010, p. 442](#)), young children living under low-risk conditions showed high wake-up cortisol values and low bedtime values, whereas children whose parents were involved with Child Protective Services (CPS) showed lower wake-up values and more blunted slopes than the low-risk children. Foster children showed values intermediate to the low-risk and the CPS group. Although the mechanism for these effects is not entirely clear, it is possible that the blunted pattern reflects adaptations to periodically high levels of circulating glucocorticoids.

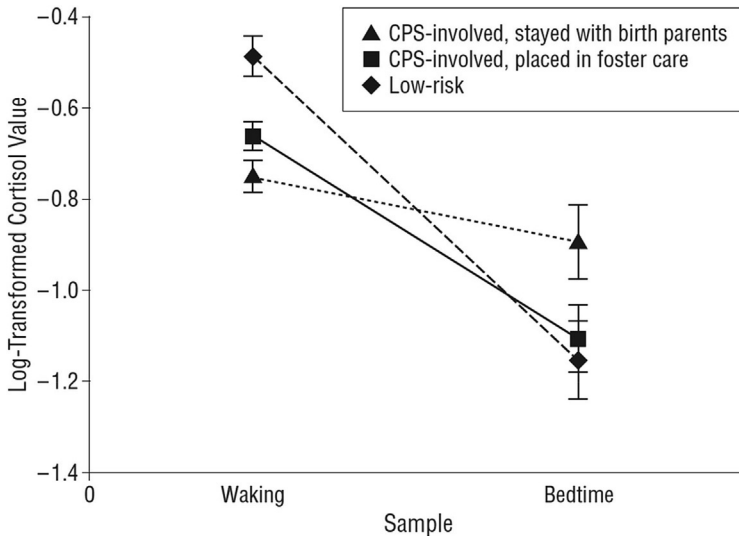


Fig. 1 Cortisol patterns for Child Protective Services (CPS)-involved children who lived with birth parents ($n = 155$), CPS-involved children placed in foster care ($n = 184$), and low-risk children ($n = 96$). Cortisol levels were measured as micrograms per deciliter. Error bars indicate SE. From Bernard, K., Butzin-Dozier, Z., Rittenhouse, J., & Dozier, M. (2010). "Young children living with neglecting birth parents show more blunted daytime patterns of cortisol production than children in foster care and comparison children." *Archives of Pediatrics and Adolescent Medicine*, 164, 442. doi:<https://doi.org/10.1001/archpediatrics.2010.54>. Copyright 2010 JAMA Pediatrics. Reprinted with permission.

1.3 The role of sensitive parenting in attachment formation

Sensitive, responsive parenting leads to children developing confidence in their parents' availability, which is key to developing secure and organized attachments. The attachment system evolved to support the infant's protracted period of dependence on the parent or parents, promoting proximity maintenance under conditions of threat. By the time infants have the capability of moving away from their parents, they have developed attachments that ensure that they seek proximity under conditions of threat (Bretherton, 1985). This biologically based attachment system characterizes infants under all except the most extreme conditions of neglect. Only 3.2% of infants in orphanages showed clear evidence of a conventional attachment classification, whereas 100% of children living with their birth parents showed clear evidence (Zeanah et al., 2005).

Given that virtually all children develop attachments, what differentiates infants is not whether they form attachments or the strength of the attachment but rather the quality of the attachment (Bowlby, 1969/1982). When

infants have repeated experiences in which their attachment figures are emotionally available in times of distress, they develop what is known as secure attachments. Secure attachments are characterized by infants seeking out their parent when they are distressed with the expectation that they will be soothed (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982). These early experiences of parental availability and the resulting secure attachments predict children's later relationships with teachers and peers. For example, in preschool, children who were secure with primary caregivers in infancy are more independent and self-reliant than other children (Matas, Arend, & Sroufe, 1978). They take on tasks with greater enthusiasm and persevere longer than other children as well. As they become older, children who were secure in their relationships with primary attachment figures are more competent in relationships with peers (Groh et al., 2014) and engage in less deviant activity than other children (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010).

When parents are insensitive to infants' signals or are inconsistent in their responsiveness, infants develop attachments, but these attachments are insecure (van IJzendoorn, 1995). When parents are rejecting of bids for reassurance, infants tend to develop avoidant attachments, characterized by the infant turning away from the parent when distressed. When parents are inconsistent in their availability, children tend to develop resistant attachments, characterized by the infant showing a mixture of proximity seeking with resistant (fussy, inconsolable) behavior. These infant strategies are well suited to maximizing parental proximity.

When parents are frightening, infants are at risk for developing disorganized attachments (Jacobvitz, Hazen, Zaccagnino, Messina, & Beverung, 2011; Lyons-Ruth, Bronfman, & Parsons, 1999). Disorganized attachments reflect a breakdown in attachment strategy, and are manifested in the infant showing anomalous behaviors when distressed, such as backing off from the parent or appearing dazed or frozen (Main & Solomon, 1990). Disorganized attachment is particularly concerning because it is predictive of externalizing problems (Fearon et al., 2010; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999) and dissociative symptoms (Carlson, 1998). Children who have experienced adversity, such as maltreatment, foster care, or orphanage care, are at increased risk for developing disorganized attachments *unless* their caregivers are nurturing and responsive (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010; Dozier, Stovall, Albus, & Bates, 2001). In order for children to organize their attachments following adversity, it seems they need nurturing care.

To summarize, the human infant is highly dependent on the availability of input from the environment, especially with regard to input from parents or other caregivers. Sensitive, responsive, nurturing care is optimal for the building of brain architecture, for the building of early regulatory capabilities, and for the building of a secure and organized attachment. The stress of ordinary living (e.g., receiving inoculations, attending day care) is proposed to be growth enhancing in the context of supportive relationships (Gunnar & Vazquez, 2001; Shonkoff, 2012). When infants experience severe adversity without effective caregivers to buffer them, brain development and self-regulatory capabilities are adversely affected. Under these conditions, children especially need sensitive, nurturing care to remediate damage (Bernard et al., 2010; Dozier et al., 2001).



2. Interventions to enhance responsive care

Preventive programs have been developed that are intended to enhance responsive parenting among parents of vulnerable infants. We will present in greatest depth on the program that we developed, Attachment and Biobehavioral Catch-up. First, though, we provide a brief overview of two other programs for this population that also have strongest evidence bases.

2.1 Video-feedback intervention to promote positive parenting-sensitive discipline

Video-feedback Intervention to Promote Positive Parenting-Sensitive Discipline (VIPP-SD: Juffer et al., 2017) incorporates attachment theory's approach to the importance of sensitive responsiveness with coercion theory's focus on the importance of setting consistent limits (Patterson, 1982). VIPP-SD is implemented through seven home visitation sessions that focus on enhancing parental empathy and sensitive discipline for parents of young children. Following an initial session, the home visitor meets with the family once or twice a month for 2 h to present and discuss video clips of the parent and child from previous sessions that highlight parental sensitivity and sensitive discipline. Efficacy for VIPP-SD comes from 12 randomized clinical trials. Meta-analytic evidence across these studies demonstrates that VIPP-SD is efficacious in enhancing attachment security, reducing attachment disorganization, and reducing child behavior problems (Juffer et al., 2017).

2.2 Child-parent psychotherapy

Child-Parent Psychotherapy (CPP), developed by [Lieberman, Weston, and Pawl \(1991\)](#) helps parents consider the effects of their own relationship history and how experiences of trauma affect their relationship with their child. Therapy seeks to strengthen the relationship as a way to protect the child within the relationship. CPP is implemented through about 50 sessions in the home or office. CPP has shown effects on attachment in some samples (e.g., [Toth, Rogosch, Manly, & Cicchetti, 2006](#)), but not in others (e.g., [Lieberman et al., 1991](#)). Child outcomes have been enhanced among children who participated in CPP, including reductions in children's angry behavior and behavior problems as reported by parents ([Lieberman, Ghosh Ippen, & Van Horn, 2006](#)), and higher morning cortisol production ([Cicchetti, Rogosch, Toth, & Sturge-Apple, 2011](#)).

2.3 Attachment and biobehavioral catch-up

Attachment and Biobehavioral Catch-up (ABC; [Dozier & Bernard, 2019](#)) is a 10-session, 1-h-long, weekly occurring home visiting program that targets three specific behaviors: nurturing children when they are distressed, following children's lead when they are not distressed, and avoiding frightening and intrusive behaviors. Compared with VIPP, ABC is several sessions longer, but considerably shorter than CPP and many other programs. Each of the three targets was identified on the basis of our own findings ([Bernard et al., 2010](#); [Dozier et al., 2001](#)) or the findings of others. We expected that targeting these issues would result in improvements in children's behavioral and biological outcomes.

2.3.1 Intervention target 1. Helping parents behave in nurturing ways

Young children who experience adversity especially need nurturance. Without nurturing care, these children are at risk for developing disorganized attachments. Therefore, although nurturing care is important for all children, it is especially important for children who experienced early adversity ([Cyr et al., 2010](#); [Dozier et al., 2001](#)). However, two things can make it difficult for parents to provide nurturing care. First, infants who have experienced adversity often behave in ways that suggest that they do not need their parents (i.e., in avoidant ways), or behave in fussy and irritated ways (i.e., in resistant ways) ([Stovall-McClough & Dozier, 2004](#)). What is most troubling is that parents, even those who might be expected to behave in nurturing ways to other infants, tend to respond "in kind" to these infants,

acting as if their infants do not need them or that they are inadequate to the task (Stovall-McClough & Dozier, 2004). Therefore, we might say that parents need to provide not only sensitive care to these infants, but *therapeutic* care. That is, parents need to be able to see through the child's behaviors to the underlying need.

A second reason parents may not be nurturing is that it may not “come naturally” to them. Parent “state of mind with regard to attachment” is the strongest predictor of infant attachment quality (van IJzendoorn, 1995). State of mind refers to how adults process their own attachment-related experiences, and is assessed through the Adult Attachment Interview (Main & Goldwyn, 1998). Parents with “autonomous” states of mind are open and reflective when describing attachment-related memories, and these parents tend to be comfortable responding directly to their infants bids for reassurance (van IJzendoorn, 1995). Parents with “non-autonomous” states of mind may dismiss the importance of, or get angrily caught up in, attachment-related issues. Thus, caregivers' conceptualizations of their attachment-related histories may make it difficult to provide the nurturance that maltreated children especially need. Additionally, parents of vulnerable infants often face a number of ongoing stressors, such as poverty, psychopathology, and lack of social support, which may interfere further with providing sensitive care (Cicchetti, Rogosch, & Toth, 2006; Lyons-Ruth, Connell, Zoll, & Stahl, 1987).

The first ABC intervention target is, therefore, helping parents behave toward their children in nurturing ways when their children are distressed—even when the child fails to elicit nurturance and even if it does not come naturally to parents.

2.3.2 Intervention target 2. Helping parents follow their infant's lead

As discussed previously, young children who experience adversity are at risk for difficulties regulating their HPA axis (Bernard et al., 2010), and are at risk for behavioral dysregulation as well (Ackerman & Brown, 2006). When children have parents who are well attuned to their signals, they develop better self-regulation than when children's parents are not as well attuned (Raver, 1996). Therefore, we reasoned that if we could help parents become highly sensitive to cues, we could remediate problems with self-regulation. We called this target “following the child's lead” because we were asking parents to carefully observe what the child was doing and to respond in a reciprocal way. Center on the Developing Child (2016) describe a similar intervention target, which they refer to as “serve and return interactions” in which the child serves and the parent returns the serve.

2.3.3 Intervention target 3. Helping parents avoid frightening behavior

When introducing the first two components of the ABC intervention (nurturing the distressed child and following the child's lead) to parents, we sometimes observed parents behaving in frightening or overwhelming ways. For example, parents sometimes yelled at, glared at, or smacked their children, including young infants. We were aware that, even if parents became nurturing and sensitive, if they were occasionally frightening, it could undermine their gains (Schuengel, Bakermans-Kranenburg, & van IJzendoorn, 1999). Frightening behavior is powerful in undermining children's ability to organize attachment behaviors (Hesse & Main, 2006) and regulate physiology (Hertsgaard, Gunnar, Erickson, & Nachmias, 1995). Hesse and Main (2006) have suggested that frightening behavior presents children with an unsolvable dilemma—they want to go to their parent for reassurance, but they are frightened of the parent. Our third intervention target was, therefore, helping parents avoid behaving in frightening ways.



3. Implementation of ABC

3.1 Home visiting

ABC is implemented in the home with any available parents and children invited to join in. The reason for implementing in the home is that parents learn about the program and practice the behaviors in the environment in which they will be using the behaviors. Practicing the behaviors in an office setting would require that the parent generalize them to a different environment, which represents a significant challenge. Practicing in the home allows working through at least some of the challenges parents will face when not in session. For example, resistance from mothers-in-law or boyfriends and challenges of attending to several children at a time, can be successfully negotiated with the support of the parent coach.

3.2 Manual guided

An intervention manual guides the delivery of ABC. Sessions introduce parents to intervention targets sequentially, providing time for parents to talk about their reactions to each target, view videos of other parents engaging in intervention targets, and practice the behaviors themselves. As we describe below, although intervention targets are presented sequentially, parent coaches make comments regarding parents' behavior related to nurturance and following the lead whenever the behaviors are seen, regardless of whether behaviors have yet been covered in intervention content.

3.3 Use of video

All sessions are video-recorded, allowing the use of video-clips in subsequent sessions. Very short clips (2–5 s) are used in the interest of clarity so that the behaviors provide unambiguous examples. These clips typically illustrate parent strengths in nurturing their children or following their children's lead. In later sessions, these clips may highlight issues with which the parents are struggling, but additional clips showing parental strengths are juxtaposed so that parents feel supported. This reliance on video-clips is also seen in other interventions (e.g., Fisher, Frenkel, Noll, Berry, & Yockelson, 2016; Juffer et al., 2017).

3.4 In-the-moment commenting

Making in-the-moment comments has been identified as an active ingredient of the ABC intervention. Parent coaches are expected to comment on parents' behaviors related to nurturance and following the lead at least once per minute. For example, if the child is pushing his toy truck around the room, and the parent says, "you've got a really fast truck," the parent coach might say, "he was pushing his truck and you said, 'you've got a fast truck.' You're following his lead! It may not seem like a big deal to you because you do things like that all the time, but that can help him develop a better attention span." Comments can include one or more of three components, with this example including all three. The first component is a description of the parent's behavior. ("He was pushing his truck and you said, 'you've got a fast truck.'") This component is important to include because it helps parents to know precisely the behavior to which the parent coach is referring. The second component is identifying the intervention target. ("You're following his lead.") Given that the targets are being discussed in sessions, this instantiation of the targets in the parent's behavioral repertoire is important to point out. The third component is linking the behavior with child outcomes. Parent coaches become familiar with a list of outcomes that have been empirically related to nurturance or following the lead that they can choose from. Including outcomes helps parents appreciate why the changes in behaviors they are making are powerful. The frequency of in-the-moment comments parent coaches make has been linked with parental change (Caron, Bernard, & Dozier, 2018).

3.4.1 Effects of intervention

The ABC intervention has been assessed in randomized clinical trials with CPS-involved children living with their birth parents (Bernard et al., 2012),

children living in poverty (Perrone et al., 2020), children in Early Head Start (Aparicio, Denmark, Berlin, & Jones Harden, 2016), foster children (Lind, Raby, & Dozier, 2017), and internationally adopted children (Yarger, Bernard, Caron, Wallin, & Dozier, 2020). In all, about 1000 families have participated in these randomized clinical trials.

3.5 Parental sensitivity

In each of these randomized clinical trials, the intervention has resulted in enhanced sensitivity among parents relative to parents receiving a control intervention (e.g., Bick & Dozier, 2013; Garnett, Bernard, Hoye, Zajac, & Dozier, 2020; Yarger et al., 2020). Parental sensitivity is seen as the intervention mechanism. (See Fig. 2.) Improvements to parental sensitivity are seen as the sine qua non for other downstream effects on child outcomes to be affected.

We highlight changes to parent sensitivity in two very different populations. First, CPS-involved parents live under very challenging conditions, with many having housing instability, mental health and substance abuse problems, and lack of resources more generally. Because of the tumultuous lives they lead, it seemed that changing sensitivity and sustaining change over time might be challenging. However, parents who received

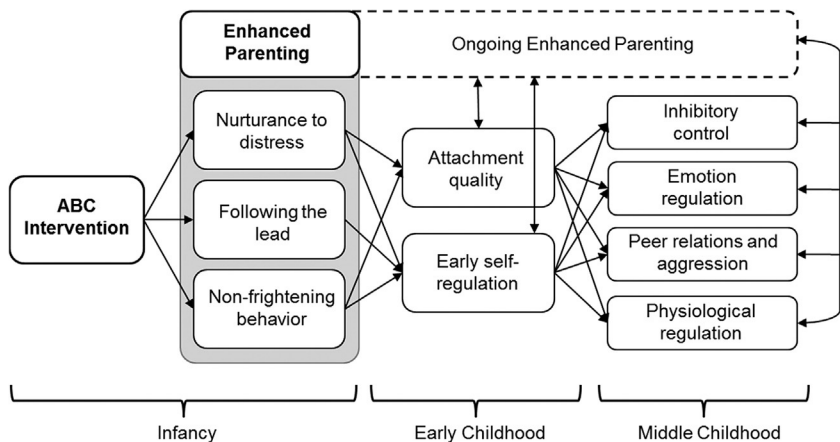


Fig. 2 Conceptual model for anticipated effects of ABC on key outcomes in early childhood and middle childhood (Dozier & Bernard, 2017, p. 111). From Dozier, M., & Bernard, K. (2017). "Attachment and biobehavioral catch-up: Addressing the needs of infants and toddlers exposed to inadequate or problematic caregiving." *Current Opinion in Psychology*, 15, 111–117. doi:<https://doi.org/10.1016/j.copsyc.2017.03.003>. Copyright 2017 Elsevier. Reprinted with permission.

the ABC intervention behaved in more sensitive ways in play interactions than parents in the control group, and changes were sustained 3 years later (Yarger, Hoye, & Dozier, 2016).

At the other end of the continuum, parents adopting internationally are often highly educated, and have invested a great deal of time and energy in adopting their child. They typically have many resources, and receive other services in addition to ABC. Colleagues who worked with this population doubted whether ABC would result in enhanced parenting responsiveness. Nonetheless, we saw effects of ABC on parents' sensitivity, which again were sustained over time (Yarger et al., 2020).

3.6 Parental neural activity

Given that parents' sensitivity changes, we expected that parents' neural activity, as assessed through event related potentials (ERPs) would also change. Rodrigo et al. (2011) found that neglecting mothers could indicate which children were laughing, crying, or neutral when presented with pictures of different emotions, but that their ERPs did not differentiate between the faces, suggesting a lack of processing of emotion cues. In particular, the N170, a negative-going deflection about 170 ms following the onset of a stimulus, was examined. Bernard, Dozier, Bick, and Gordon (2015) examined whether participation in the ABC intervention might result in mothers showing differential neural activity. Bernard et al. replicated Rodrigo et al.'s findings, with the mothers who received the control intervention having neural activity that failed to differentiate the faces, whereas low-risk mothers' neural activity showed a differentiation of the faces. For mothers who received the ABC intervention, however, neural activity showed a differentiation of the faces, suggesting that the intervention enhanced attention to infant emotions at the neural level.

3.7 Parental attachment narratives

One of the ways in which ABC helps parents change is by sensitizing them to children's attachment needs. We therefore examined whether ABC enhanced the coherence of parents' attachment narratives using a methodology developed by Waters (see Waters & Roisman, 2019). Mothers were presented multiple sets of words, with some sets suggestive of attachment themes and others not. For example, one attachment-themed set included the words "Fall, cry, doctor, scared...." As predicted, parents who had received the ABC intervention developed more coherent narratives in

response to word prompts than parents who received the control intervention (Raby, Waters, Tabachnick, Zajac, & Dozier, 2021).

Given that ABC was developed with the goal of helping children develop secure, organized attachments, and enhance self-regulatory capabilities, attachment and cortisol production were two primary child outcomes of interest.

3.8 Child attachment

Attachment is assessed through the Strange Situation, which consists of a series of separations and reunions between infant and parent. CPS-involved children whose parents received the ABC intervention developed secure attachments at higher rates than children whose parents received the control intervention (52% and 33%, respectively). Fewer of the children from the ABC intervention than from the control intervention developed disorganized attachments (32% and 57%, respectively). Given that attachment security and organization are predictors of later peer relationship quality and of better mental health outcomes (Fearon et al., 2010), we consider these findings exciting.

Whereas attachment can best be assessed at the behavioral level in infancy, the construct can be assessed at a representational level beyond infancy. Children can be asked about actual or imagined times when they might rely on their parents for reassurance. At age 9, children were asked about the extent to which they felt secure in their relationships with their parents using the Kerns Security Scale (Kerns, Klepac, & Cole, 1996). Children whose parents had received the ABC intervention almost a decade earlier, indicated that they trusted in their parents' availability more than children whose parents had received the control intervention (Zajac, Raby, & Dozier, 2020). Children in a low-risk group reported higher trust in parents' availability than the control group but were not significantly different from the ABC group.

3.9 Child diurnal cortisol production

Following the intervention, infants whose parents received the ABC intervention showed more normative patterns of cortisol production than seen among children in the control intervention. As can be seen in Fig. 3, children in the ABC group show a higher morning value and steeper slope across the day than children in the control group (Bernard, Hostinar, & Dozier, 2015). Three years after participating in the intervention, these

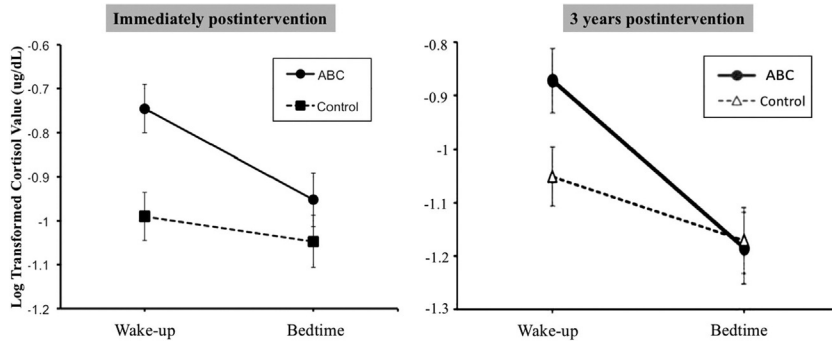


Fig. 3 Effects of ABC on diurnal cortisol rhythms. *From Dozier, M., & Bernard, K. (2019). "Coaching parents of vulnerable infants: The attachment and biobehavioral catch-up approach." Guilford Press. Copyright 2019 Guilford. Reprinted with permission.*

effects were sustained, with children from the ABC group continuing to show higher wake-up cortisol values and steeper slope across the day than children in the control group (Bernard, Simons, & Dozier, 2015). When examining diurnal production in middle childhood when children were 8–10 years old, the effects of ABC on the slope across the day were mediated by parental sensitivity (Garnett et al., 2020). In other words, parents who completed the ABC intervention showed higher levels of parental sensitivity when their children were infants than control group parents, which predicted a steeper decline in children's wake-up to bedtime cortisol concentration during middle childhood.

Enhancing attachment organization and the regulation of cortisol were considered proximal outcomes of the ABC intervention. Other child outcomes, such as enhancing behavioral regulation or brain functioning were considered more distal. Nonetheless, effects on these other outcomes were seen as we describe below.

3.10 Child behavior regulation

The ability to regulate behavior is an important predictor of success in school and success with peers (Blair & Raver, 2015). For example, children who can sit in their desks and inhibit the urge to get up and look out the window at peers playing outdoors will be less likely to get in trouble than children who cannot sit quietly. This ability to inhibit a dominant behavior in favor of a preferred behavior, termed inhibitory control, is therefore critical. We studied inhibitory control by presenting children with an attractive and engaging set of toys and asking them not to touch them for a period of time.

Although challenging, this task is not unlike the many challenges children face when they begin preschool. Preschoolers whose parents received the ABC intervention were more successful in inhibiting the urge to touch the prohibited toys than children whose parents received the control intervention. Fewer of the ABC than control children touched the toys, and those who did touched the toys for a smaller percentage of time than children in the control intervention (Lind, Bernard, Yarger, & Dozier, 2020). This effect was partially mediated by parental sensitivity. Effects on inhibitory control were sustained into middle childhood (Korom et al., 2020).

3.11 Child brain development

As children develop, their brains mature with regionally heterogeneous patterns. The cortical areas that are responsible for basic perceptual functions, such as sight or smell, reach their full maturity early in development, whereas cortices that aid higher order functioning (e.g., frontal, prefrontal, and parietal cortices underlying emotion regulation and cognitive development) are the slowest to mature. Although it takes more than two decades for these cortices of the “neotenus brain” (Tottenham, 2019) to complete their maturational process, the first few years of life are critical for establishing their developmental potential.

Early experiences of maltreatment or neglect have been associated with delays in cortical maturation. Cortical maturation can be assessed with electroencephalography (EEG), which uses electrodes on the scalp to measure brain electrical activity. More high frequency activity, such as high frequency beta (oscillation 12–20 Hz frequency), is associated with more mature cortical development (Vanderwert, Marshall, Nelson, Zeanah, & Fox, 2010). At 8 years old, children whose parents received the ABC intervention showed more high frequency beta activity than children in the control group (Bick, Palmwood, Zajac, & Simons, 2019).

We also used magnetic resonance imaging (MRI) to allow assessment of brain activity in response to specific stimuli. Of particular interest were differences in brain activation in tasks in which children viewed pictures of their mothers and pictures of strangers with similar features. Compared with children in the control group, children in the ABC group showed greater activation in the cingulate, precuneus and hippocampus when viewing their mothers relative to strangers (Valadez, Tottenham, Tabachnick, & Dozier, 2020a). These results suggested that for children whose mothers received ABC, there was special salience to their own mothers.

In a second imaging task, children were presented with fearful and neutral faces. Children whose parents received the ABC intervention showed a pattern of negative prefrontal cortex (PFC)–amygdala connectivity, essentially opposite from that shown by the control children who showed positive prefrontal cortex–amygdala connectivity (Valadez, Tottenham, Tabachnick, & Dozier, 2020b). Negative PFC–amygdala connectivity suggests that when the PFC is active, the amygdala is not; that is, the PFC appears to be effective in “quieting” the amygdala. This negative connectivity pattern is consistent with a mature pattern of top–down regulation (Lee, Heller, van Reekum, Nelson, & Davidson, 2012).

In this section, we have highlighted a number of ABC findings, and have skipped over others, including positive findings for enhancing executive functioning (Lewis-Morrarty, Dozier, Bernard, Terraciano, & Moore, 2012; Lind et al., 2017), autonomic nervous system regulation (Tabachnick, Raby, Goldstein, Zajac, & Dozier, 2019), emotion expression (Lind, Bernard, Ross, & Dozier, 2014), and language development (Raby, Freedman, Yarger, Lind, & Dozier, 2020), and altering DNA methylation (Hoye et al., 2020). The findings have been compelling across a range of domains and extending at least through middle childhood. While the strength of the findings has surprised us, we are aware that enhancing parental responsiveness has cascading effects on children’s outcomes.

3.11.1 Dissemination of ABC

Having found good evidence for ABC’s efficacy through randomized clinical trials, disseminating the program to other places seemed to represent a next logical step. As a field, though, prevention science has not been very successful implementing evidence-based interventions in the community (e.g., Durlak & DuPre, 2008). Indeed, the medium to large effect sizes seen in randomized clinical trials (when implemented under controlled conditions) are often significantly reduced in the community, with small or even negligible effect sizes seen (Schoenwald & Hoagwood, 2001). A range of problems can be manifested when interventions are moved out into the community, but one of the most common is poor fidelity to the model (Hulleman & Cordray, 2009). That is, it is not a matter of simply indicating on a checklist whether parent coaches have covered various content (i.e., adherence), but whether they have done so competently (i.e., fidelity).

In our first attempts to implement ABC in the community, we had not conceptualized or operationalized model fidelity clearly. We provided training in the model, and supervised parent coaches weekly throughout a

12-month period. However, we were finding that parent coaches were not implementing the ABC intervention as intended. As the result of data coming in from our randomized clinical trials and from observing our failures disseminating (Caron et al., 2018), we realized that making in-the-moment comments represented an active ingredient of ABC. This represented a first step—but operationalizing how comments should be made and devising a plan whereby this skill could be acquired were critical next steps. Making comments was difficult, unlike intervention strategies with which parent coaches were accustomed, and as a result, parent coaches often made few comments. It was essential that we have a way to measure in-the-moment comments, and find ways to ensure parent coaches could learn the technique.

EB Caron developed an ingenious system for measuring in-the-moment comments (Caron & Dozier, 2014). Using a 5-min clip selected at random from sessions, each opportunity for making a comment was coded (i.e., each time the parent nurtured or failed to nurture a distressed child, and each time the parent followed the lead or failed to follow the lead). Then, the parent coach's verbal response (regarding nurturing/not nurturing, and following/not following) was coded, including the number of the three components included in comments (i.e., description of behavior, link to intervention target, and link to child outcome). The automatic spreadsheet yields a number of summary statistics for the 5-min period, including the percentage of on-target comments, the average number of components in comments, and so on. This system allowed us to establish criteria that we expected parent coaches to meet, and to provide weekly feedback regarding progress. The final step was recognizing that parent coaches would become effective self-critics only if they learned to code themselves. Parent coaches were taught to code themselves and coded the same 5-min segment coded by supervisors each week. It was at this point that parent coaches successfully acquired the skill of commenting, and we were able to monitor fidelity.

We have provided extensive detail regarding our challenges and our successes with implementing ABC with fidelity because this is such a critical issue for so many interventions. Although our particular strategies will not be helpful for others, the issues involved likely have parallels. At this point, nearly all parent coaches whom we accept for training meet criteria at the end of the training year and are certified as ABC parent coaches (Caron & Dozier, 2019; Caron, Weston-Lee, Haggerty, & Dozier, 2016). More telling, though, is that effect sizes for ABC in the community are as large as effect sizes seen in randomized clinical trials (Roben, Dozier, Caron, & Bernard, 2017).



4. Policy recommendations

4.1 Reduce reliance on institutional care

Institutional or orphanage care remains the primary way children receive out-of-home care worldwide, with approximately 7.2 million children estimated to be in care (although the range of estimates is quite large, extending from 2 million to 9 million) (Desmond, Watt, Saha, Huang, & Lu, 2020). Although quality of care varies enormously, institutional care is not well suited to children's developmental needs (Dozier, Kaufman, Kobak, O'Connor, et al., 2014; Dozier, Zeanah, Wallin, & Shaffer, 2012). Even though institutional care per se is not relied on heavily in the United States, the issue should not be overlooked. We note that group care for children, including for very young children, continues to exist in various places in the United States. Certainly, a tragic example was seen with the separation of infants and young children from their parents at the US-Mexico border. Other less extreme examples of shelters, group care, or congregate care also exist. Often such arrangements are seen as temporary, but may result in extended stays nonetheless.

When countries move from reliance on institutional care to family-based care, they often meet with challenges or resistance for a host of reasons. Institutions are built environments that may employ a number of people in the community. Also, advocates of institutional care have often invested time and/or resources in the institutions. One of the practices that serves to maintain support for institutional care is voluntourism (Zeanah et al., 2019), which involves volunteering in an institution for a period of time. Given that institutionalized children sometimes show indiscriminate sociability (Zeanah et al., 2019), volunteers feel welcomed and useful, unaware that the disruptions in forming relationships with many, many caregivers that they perpetuate could be detrimental to children. Volunteers may return to their native country and provide monetary support or advocate for the use of orphanage care, based on having felt useful and valued.

One of the key elements in moving successfully away from institutional care is building an effective support system for birth parents and an effective foster care system. When countries attempt to make the transition by strengthening other services, chances for success are enhanced.

4.2 Support foster care system

The best alternative when out-of-home care is needed is some form of alloparenting, such as foster care or a less formal system in which relatives

or other community members care for children. A system of alloparenting has been in place over the course of time, with other adults stepping in to care for children when parents died or were unable to take care of children (Kenkel, Perkeybile, & Carter, 2017). Given the protracted period of immaturity for human children, and therefore the need for care over a long period of time, alloparenting has been critical.

Although it is difficult to estimate the number of children in informal foster care, about 420,000 are in formal foster care in the United States (U. S. Department of Health and Human Services, 2020). Despite serving a critical role in society in the United States, the public perception of foster care may at times be negative. Sometimes foster parents' motivations for fostering are questioned. Often foster parents are not provided with critical information about the children they are fostering or plans for the children. As a result, foster parents often feel unappreciated and disenfranchised, which interferes with recruiting and retaining foster parents (Zeanah, Dozier, & Shauffer, 2011). Efforts to build a different "brand" of foster care have been undertaken by Carole Shauffer of Youth Law Center through Quality Parenting Initiative (<https://www.qpi4kids.org>). Quality Parenting Initiative seeks to recruit foster parents who are interested in supporting birth parents through visitation and building the necessary skills and credentials to regain custody of their children.

Working with Quality Parenting Initiative, a visitation support program called Fostering Relationships was designed to enhance the experience of visitation for foster parents, birth parents, and children (Roben & Dozier, 2019). Visitation can often be a noxious experience for all involved, with foster parents feeling angry that birth parents upset their children, birth parents feeling rejected by their children and disapproved of by foster parents, and children having a chaotic, unsettling experience. Fostering Relationships is a brief (five session) program modeled on ABC, but with much more limited scope. Foster parents accompany their young children to visitation between children and their birth parents, thereby avoiding an unnecessary separation. Foster parents are coached ahead of time to make comments in the moment to birth parents, supporting birth parents in following their children's lead. Birth parents are mentored before each session such that they anticipate that their child may not remember them or come to them, and helping them to interact in sensitive, responsive ways that will make it easier for their child to approach them. Pilot work with the program supports its efficacy in enhancing sensitive responsiveness in birth parents, positive feelings of birth and foster parent toward one another, and the likelihood of returning for subsequent visits (Roben & Dozier, 2019). Randomized clinical trials are still needed, though.

In addition, foster parent responsiveness can be enhanced with programs such as ABC, with positive outcomes for children in care. Historically the child welfare system has not relied heavily on evidence-based interventions, but that has begun to change. Several registries of evidence-based programs exist, including the California Evidence-Based Clearinghouse for Child Welfare <https://www.cebc4cw.org>, Home Visiting Evidence of Effectiveness <https://homvee.acf.hhs.gov>, and Title IV Prevention Services Clearinghouse <https://preventionservices.abtsites.com>. Relying on programs with an established evidence base that can be implemented with good fidelity is key to providing quality services.

4.3 Support prevention programs for birth parents

Critical to an effective system of child welfare is providing support for birth parents. In this paper, we have described one such program in detail and provided an overview of several other programs. These programs help parents provide sensitive, responsive care for parents. While nurturing care is in our view the top priority for children, parents also need support with other aspects of their life as well, such as financial assistance, help with mental health and substance abuse issues, and help dealing with domestic violence. The Home Visiting Applied Research Collaborative (HARC: <https://www.hvresearch.org/precision-home-visiting/>) has advocated for a precision medicine approach to home visiting for vulnerable families. This precision home visiting approach would involve assessing the specific issues with which families need help, and providing evidence-based interventions for those specific issues. We consider this a wise approach.



5. Conclusion

Infants and young children are especially susceptible to their environments. In early childhood, children develop the foundation for self-regulatory capabilities and for a sense of trust in themselves and others, as well as other key capabilities. Parents who behave in sensitive, nurturing ways are providing the needed input into this developing system. Such care is especially important when children have experienced adversity, but at such times, the likelihood that children will receive such care may be diminished because parents lack needed resources, and/or children behave in ways that fail to elicit responsive care. Parenting programs that enhance responsiveness, and a system that supports parenting, are critical to enhancing children's outcomes.

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