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Enhancing Attachment Organization Among Maltreated Children: Results of a Randomized Clinical Trial

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Abstract

Young children who have experienced early adversity are at risk for developing disorganized attachments. An intervention, Attachment and Biobehavioral Catch-up (ABC), was developed that very specifically targets nurturing, sensitive care among the parents identified as being at risk for neglecting their young children, with the aim of decreasing disorganized attachment. The ABC intervention consists of 10 parent-child sessions conducted in families' homes. The present study assessed the efficacy of this intervention through a randomized clinical trial in which parents with Child Protective Services involvement were assigned to the experimental intervention or to a control intervention (DEF). Attachment quality was assessed for 120 children in the Strange Situation. Children in the ABC intervention showed significantly lower rates of disorganized attachment (32%) and higher rates of secure attachment (52%) relative to the control intervention (57% and 33%, respectively). These results support the efficacy of the ABC intervention in enhancing attachment quality among parents at high risk for maltreatment.

Children who experience early adversity, such as neglect, abuse, exposure to domestic violence, and separations from caregivers, are at increased risk for developing disorganized attachments (Carlson, 1998; Lyons-Ruth, Connell, Zoll, & Stahl, 1987; Stovall-McClough & Dozier, 2004; van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). These children's caregivers need to provide nurturing, sensitive care, indeed even therapeutic care, if such children are to develop organized attachments (Dozier, Stovall, Albus, & Bates, 2001). Parents whose children have experienced early adversity, however, are unlikely to have the resources to provide such care; without intervention, they often continue to expose children to adverse conditions rather than provide them with "therapeutic" parenting. To address this need, a manualized 10-session intervention, Attachment and Biobehavioral Catch-up (ABC), was developed that targets three parental behaviors among high-risk

parents: providing nurturing care when children are distressed, following children's lead when children are not distressed, and not behaving in frightening ways. The present study assessed the efficacy of this intervention through a randomized clinical trial in which parents with Child Protective Services involvement were assigned to the experimental intervention or to a control intervention.

Attachment disorganization

Most children develop organized attachments to their parents, marked by clear strategies for managing stressful events in their parents' presence. During times of distress (e.g., separation, illness, threat), securely attached children will seek out and be easily soothed by their parents. In contrast, insecurely attached children may turn away from their parents (i.e., avoidant), or may act fussy and be difficult to soothe (i.e., resistant). Children develop these organized strategies based on their history of interactions with their parents, through which they learn whether parents will be available and responsive to their signals in times of distress (Ainsworth, Blehar, Waters, & Wall, 1978). Some children, however, temporarily show a lack of strategy or breakdown in strategy when distressed and in their parents' presence. This breakdown in strategy has been termed disorganized attachment (Main & Solomon, 1990). Main and Solomon identified specific ways that infants show this breakdown in the presence of their parents, including simultaneous or sequential display of contradictory behaviors, apprehension of the parent, misdirected attachment behavior, stereotypies, stilling or freezing, and other indices of confusion (Main & Solomon, 1990).

Disorganized attachment is particularly important because it is associated with problematic long-term outcomes. In two longitudinal studies of development from infancy through early adulthood, disorganized attachment has been found predictive of adverse outcomes (Carlson, 1998; Lyons-Ruth, Easterbrooks, & Cibelli, 1997). Carlson found that disorganized attachment at 18 months of age predicted dissociative symptoms during middle school, high school, and early adulthood, based on teacher-report, self-report, and clinical interviews. Attachment disorganization in infancy was moderately correlated ($r = .36$) with self-reported dissociation on the Dissociative Experiences Scale at age 17. Lyons-Ruth et al. (1997) found that disorganized attachment at 18 months predicted teacher-reported externalizing symptoms at age 7 ($r = .31$). In a recent meta-analysis, Fearon and colleagues (2010) found that disorganized attachment placed children at elevated risk for externalizing problems ($d = .34$), relative to children with insecure-avoidant and insecure-resistant classifications (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010).

According to Main and Hesse (1990), children develop disorganized attachments as the result of being frightened of the person to whom they look for reassurance. Given that these children's parents are both a source of comfort and a source of fear, they face an "unsolvable dilemma" during times of elevated arousal or threat (Main & Hesse, 1990). Conflicting tendencies to seek out and to avoid the parent make such children appear dissociative, confused, or disoriented during times of heightened distress (Carlson, 1998). In addition to lacking a behavioral strategy for dealing with stress in the presence of their parents, children with disorganized attachment also appear more dysregulated biologically at these times. Among infants with organized attachments, it is very hard to elicit a "stress response" in the form of elevated cortisol (for reviews, see Gunnar, Talge, & Herrera, 2009; Jansen, Beijers, Riksen-Walraven, & de Weerth, 2010). For example, during the sequence of separations and reunions in the Strange Situation, infants with organized attachments do not show increases in cortisol production. However, infants with disorganized attachments are not buffered from stress in such ways; rather, they show stress reactive responses in the form of elevated cortisol (Bernard & Dozier, in press; Hertsgaard, Gunnar, Farrell, Erickson, & Nachmias,

1995; Spangler & Grossman, 1993) or sympathetic nervous system reactivity (Oosterman, De Schipper, Fisher, Dozier, & Schuengel, 2010). Luijk and colleagues (2010) found that children with disorganized attachments did not show heightened cortisol reactivity, but did show more blunted diurnal patterns of cortisol production relative to children with organized attachment. Thus, across studies, children with disorganized attachment appear to be at risk of physiological dysregulation.

Although parental insensitivity alone is predictive of insecure, but organized, attachment patterns (De Wolff & van IJzendoorn, 1997), insensitivity alone is not strongly associated with disorganized attachment (van IJzendoorn et al., 1999). Rather, frightening or frightened parental behavior (Main & Hesse, 1990; Schuengel, Bakermans-Kranenburg, & van IJzendoorn, 1999; True, Pisani, & Oumar, 2001), and other atypical maternal behaviors such as hostile or negative-intrusive behaviors, withdrawing behaviors, and role-confused behaviors (Lyons-Ruth, Bronfman, & Parsons, 1999; Lyons-Ruth, Yellin, Melnick, & Atwood, 2005), are associated with disorganized attachment. Furthermore, disorganized attachment has been shown to mediate the association between these atypical, disrupted maternal behaviors and toddlers' behavior problems (Madigan, Moran, Schuengel, Pederson, & Otten, 2007). Children who have experienced severe early adversity are especially likely to develop disorganized attachments to parents (van IJzendoorn et al., 1999). Most notably, children who have been maltreated by their parents show particularly high rates of disorganized attachment (Barnett, Ganiban, & Cicchetti, 1999; Carlson, Cicchetti, Barnett, & Braunwald, 1989; Cicchetti & Barnett, 1991; Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010; Lyons-Ruth et al., 1987; van IJzendoorn et al., 1999).

Parents' history of unresolved loss or trauma is predictive of children's disorganized attachment (Lyons-Ruth & Jabovitz, 2008; Lyons-Ruth, Repacholi, McLeod, & Silva, 1991; Main & Hesse, 1990; van IJzendoorn, 1995). More global parental problems, including parental depression, substance use, and inter-parental discord are also associated with increased incidence of child disorganized attachment (Lyons-Ruth et al., 1991; O'Connor, Sigman, & Brill, 1987; Owen & Cox, 1997; Teti, Messinger, Glefield, & Isabella, 1995); however, these findings are mixed and less substantial than associations with attachment state of mind when examined meta-analytically (van IJzendoorn et al., 1999).

Interventions targeting disorganized attachment

Given the adverse later outcomes associated with disorganized attachment in childhood, it is not surprising that disorganized attachment has been the target of early intervention efforts. Bakermans-Kranenburg, van IJzendoorn, & Juffer (2005) conducted a meta-analysis of 15 preventive interventions (in 10 studies) that targeted disorganized attachment, including interventions for depressed mothers (Cooper & Murray, 1997; Gelfand, Teti, Seiner, & Jameson, 1996), mothers of internationally-adopted infants (Juffer, Bakermans-Kranenburg, & van IJzendoorn, 2005), mothers of infants with health or behavioral problems (Cohen et al., 1999; Sajaniemi et al., 2001; van den Boom, 1994), and high-risk mothers (Bakermans-Kranenburg, Juffer, & van IJzendoorn, 1998; Egeland & Erickson, 1993; Heinicke et al., 1999; Lyons-Ruth, Connell, & Grunebaum, 1990), with most evaluated in randomized clinical trials. The overall effect size of these interventions on disorganized attachment was non-significant ($d = .05$), although several factors were associated with effect size. Regarding sample characteristics, effects were larger for interventions for families with infants older than 6 months of age and for families in which the risk resided primarily in the child, rather than the parent. Regarding intervention characteristics, effects were larger for interventions that used a manualized approach, and that focused on changing maternal sensitivity only as opposed to maternal attachment-related representations or social support).

Of the studies included in the meta-analysis, four targeted disorganized attachment among high-risk mothers (i.e., had multiple risk factors, including risk for inadequate parenting) and their young children. Given that the current study focuses on families involved with Child Protective Services due to elevated risk of maltreatment or neglect, these four studies will be discussed in more detail. First, Lyons-Ruth and colleagues (1990) evaluated the effectiveness of an intervention program for mothers referred by external agencies (e.g., education programs, pediatric clinics, social services) due to concerns about inadequate caregiving. Of the 31 treated mothers, many were depressed and low-income. A notable proportion (32%) had a documented history of maltreating their children. Families received between 9 and 18 months of weekly intervention sessions; on average, families received approximately 47 home visits across a span of 13 months. The intervention was aimed at providing a supportive relationship (i.e., between mother and home visitor), enhancing access to resources and services, promoting more sensitive and stimulating parenting behaviors, and strengthening mothers' social support networks. Two service levels were implemented (professional vs. paraprofessional), both intended to meet the same four aims. Whereas the paraprofessional service providers helped parents through more standard social service practices, the professional service model was more psychodynamic in nature. Both levels of services were collapsed for analyses, and compared with untreated, high-risk families ($n = 10$) and untreated, community families ($n = 35$); notably, random assignment was not used. Following treatment, 54% of high-risk infants had disorganized attachments, compared with 70% of the untreated, high-risk infants and 34% of the untreated, community infants. The effect size of this difference in disorganized attachment between high-risk children who received intervention services versus those that did not was small ($d = .30$) (Bakermans-Kranenburg et al., 2005).

Egeland and Erickson (1993) evaluated the effectiveness of the STEEP (Steps Toward Effective, Enjoyable Parenting) program for first-time parents with multiple risk factors (e.g., poverty, life stress, lack of social support). Parents participated in bi-weekly individual sessions, which began prenatally and continued until children were 1 year old, as well as group sessions on alternating weeks starting after children were born. Similar to Lyons-Ruth et al. (1990), the STEEP program was long-term, with an average of 30 sessions. The primary aim of the STEEP program was enhancing sensitivity, by targeting the factors that interfered with sensitive care. Parents observed themselves in videotapes and were guided to recognize their children's signals, take their children's perspectives, and understand their children's needs. Furthermore, STEEP interventionists helped parents recognize factors that interfered with their ability to sensitively respond to their children's needs (i.e., lack of concurrent social support, their own attachment-related experiences) and helped them overcome these challenges. The relationship between the parent and interventionist was considered critical to change, and thus, interventionists focused on parents' strengths and on maintaining a supportive, consistent relationship. A total of 154 mothers participated in a randomized control trial, and 135 were evaluated with the Strange Situation when children were 13 months old. There were no significant effects on attachment security or attachment organization. Of the children in the intervention group, 41% were classified as disorganized, compared with 19% in the control group, resulting in an effect in the unexpected direction ($d = -.49$).

Bakermans-Kranenburg and colleagues (1998) identified high-risk parents who had a non-autonomous attachment state of mind classification on the Adult Attachment Interview (George, Kaplan, & Main, 1985) and randomly assigned them to one of three groups: one control group, which received no intervention, and two intervention groups. Both intervention groups involved 4 intervention sessions conducted in parents' homes when children were between 7 and 10 months of age. The first intervention (VIPP: Video Intervention to promote Positive Parenting) provided written information and video

feedback regarding sensitive parenting. Each session had its own theme: (1) noticing children's contact-seeking and explorative behaviors, (2) attending to more subtle signals and cues, (3) responding promptly and appropriately to signals, and (4) empathic responding to and sharing in children's experiences of emotions. These topics were addressed by using clips of videotaped interactions between the target mothers and their infants, as well as by providing brochures with additional information and suggestions regarding sensitive care. The second intervention (VIPP-R: Video Intervention to promote Positive Parenting-Representation) used the same model, but involved an additional component designed to address mothers' insecure representations of attachment. Following the video feedback and brochures, interventionists discussed mothers' own histories of attachment-related experiences and the effects of those experiences on their thoughts, feelings, and parenting behaviors. Each session had its own theme: (1) separations in childhood, (2) parenting behaviors of mothers' parents, (3) changes and challenges during adolescence, and (4) recognizing the messages they received and internalized from their parents. Through these discussions, mothers were challenged to recall their own experiences in childhood, reflect on how those experiences had affected their parenting, and consider ways in which they might provide their children with different experiences. Thirty dyads were evaluated in a preliminary report, with 10 participants in each group. Attachment quality was evaluated when children were 13 months, but no significant differences were found for attachment security or attachment organization. Percent of children with disorganized attachment was in the unexpected direction, with 40%, 30%, and 20% in the first intervention group (VIPP), second intervention group (VIPP-R), and control group, respectively (VIPP effect size: $d = -.41$; VIPP-R effect size: $d = -.21$).

Heinicke and colleagues (1999) identified first-time mothers at high risk due to at least 4 of a potential 12 risk factors (e.g., poverty, victim of childhood abuse, unplanned pregnancy, lack of social support). Seventy families were randomly assigned to receive the intervention or pediatric follow-up visits (comparison group). The intervention was primarily focused on helping mothers experience a supportive, positive relationship with their interventionist. Interventionists implemented more specific intervention components (e.g., enhancing mothers' communication and adaptation skills) depending on mothers' needs. The home-visiting intervention involved weekly sessions across the first year of the child's life (average number of sessions completed during the first year was 36), sessions every other week the second year, and follow-up phone calls across the third and fourth years. Additionally, mothers were invited to attend a weekly mother-infant group (average number of group sessions attended was 17). In addition to enhanced attachment security among children in the intervention group, the intervention demonstrated effects on disorganized attachment. Of 31 children in the intervention group assessed in the Strange Situation, 13% were classified as disorganized, whereas 27% of the 22 children in the control group were classified as disorganized (effect size: $d = .36$).

More recently, Cicchetti, Rogosch, and Toth (2006) conducted a randomized clinical trial (not included in the meta-analysis described below) of two preventive interventions for infants living in maltreating families: infant-parent psychotherapy (IPP) and psychoeducational parenting intervention (PPI). The infant-parent psychotherapy (Fraiberg, Adelson, & Shapiro, 1975; Lieberman, 1992) sessions were conducted in a non-directive manner, in that therapists did not teach skills, follow an agenda, or structure activities. Rather, the therapists and mothers observed the infants together, and the therapist responded empathically to the mothers' behaviors, concerns, and feelings. Ideally, therapists provided a "corrective emotional experience" by supporting mothers as they became aware of and explore their own distorted representations of their infants' behaviors that presumably reflected their own histories of insecure attachment-related experiences (Cicchetti et al., 2006). The psychoeducational parenting intervention (Olds et al., 1997, 1998) provided

education regarding parenting skills through a primarily didactic approach. Home visitors implemented supplemental components to enhance parents' stress management skills, problem-solving ability, and social support networks. Differing from infant-parent psychotherapy, sessions of the psychoeducational parenting intervention were guided by an agenda of specific topics. Both interventions were long-term, with weekly sessions conducted over a 12-month period. Both intervention groups (i.e., infant-parent psychotherapy and psychoeducational parenting intervention) showed significantly lower rates of disorganized attachment at post-intervention assessments, compared to community standard (treatment as usual) and normative (non-maltreating) control groups, with medium to large effect sizes ($d = .84 - 1.13$).

Moss and colleagues (in press) evaluated the efficacy of a short-term attachment-based intervention for parents reported for maltreating their young children. The intervention was developed based on our intervention as well as interventions developed by Bakermans-Kranenburg et al. (1998) and Moran, Pederson, and Krupka (2005). The primary aim of the intervention was to enhance sensitivity. Parents received eight home visits, during which interventionists discussed an attachment-related theme chosen by the parent (e.g., separation, emotion regulation), videotaped an interaction activity, and provided feedback regarding parenting behaviors using the videotaped interaction. Sixty-seven dyads completed the pre-test and post-test Strange Situation, with 35 randomly assigned to the intervention group and 32 to the control group. The intervention appeared effective in both reducing rates of disorganized attachment (change from disorganized attachment at pre-test to organized attachment at post-test) and protecting children from developing disorganized attachments (preventing change from organized attachment at pre-test to disorganized attachment at post-test). Whereas 13 children (37.1%) in the intervention group changed from a pre-test classification of disorganized attachment to a post-test classification of organized attachment, only 5 children (15.6%) in the control group showed this pattern. Furthermore, whereas only 1 child (2.9%) in the intervention group changed from a pre-test classification of organized attachment to a post-test classification of disorganized attachment, 7 children of the control group (21.9%) followed this pattern. Chi-square analyses showed that these changes in attachment classifications were significantly different between the groups. At post-test, 20 percent of children in the intervention group were classified as disorganized, compared with 56.3 percent of children in the control group (effect size: $d = .79$). Taken together, these efforts to change disorganized attachment among young vulnerable children have been exciting, but the results have not been consistently compelling.

Attachment and Biobehavioral Catch-up Intervention

Attachment and Biobehavioral Catch-up was developed specifically to decrease frightening behavior and to enhance sensitive, nurturing care among parents identified by Child Protective Services as being at high risk for maltreating their children. The intervention was an adaptation of an intervention for young children in foster care (Attachment and Biobehavioral Catch-up for Infants in Foster Care). A number of properties of the intervention are consistent with qualities that have distinguished more effective from less effective interventions in the literature.

First, the intervention was designed to be relatively brief, completed in 10 sessions, as suggested by a meta-analysis conducted by Bakermans-Kranenburg, van IJzendoorn, and Juffer (2003), which found that attachment-based interventions with a small to moderate number of sessions were more effective than longer interventions (> 16 sessions). Second, the intervention was manualized, with each session having a specific focus. Treatment manualization is considered an important factor in treatment integrity and treatment

effectiveness, both in general (Weisz, Jensen-Doss, & Hawley, 2006) and in interventions targeting disorganized attachment (Bakermans-Kranenburg et al., 2005). Third, the intervention's focus was on changing parenting *behaviors* rather than parenting internal representations, suggested as important by Bakermans-Kranenburg et al. (2005). Fourth, the intervention involved parents and children together (rather than parents alone). This allowed parents to practice new skills while being observed and gently guided by parent trainers. The "in-the-moment" feedback (or intervener response to observations of parent and child at the time) was considered key to the intervention. Interventions that are conducted prenatally, and thus without the child present, are found to be less effective than those conducted after the birth of children (Bakermans-Kranenburg et al., 2005). Perhaps these prenatal interventions are less effective because they do not allow for this "in-the-moment" scaffolding and parents' subsequent practicing of newly emerging skills. Finally, interventions were conducted in parents' homes and parents were encouraged to include other children and adults who live in the home to be present. New skills were expected to generalize better if conditions more closely approximated their typical conditions (Bouton, Woods, Moody, Sunsay, & Garcia-Gutierrez, 2006).

The Present Study

The efficacy of the Attachment and Biobehavioral Catch-up (ABC) was evaluated through a randomized clinical trial for young children at risk for maltreatment, given their parents' recent involvement with Child Protective Services. Given the focus on changing parenting behaviors related to overall sensitivity, and more specifically to frightening behaviors, we expected that children of parents receiving the ABC intervention would be more likely to develop organized attachments than children of parents receiving a control intervention.

Method

Participants

Participants included 120 children and 113 parents (7 parents had two children enrolled in the study). Parents were referred by agencies working with Child Protective Services in a large, mid-Atlantic city. All parents were enrolled in the city's program that was intended to divert children from foster care (called here the Diversion from Foster Care Program) because of identified needs and/or concerns that children were at risk. Domestic violence, parental substance use, homelessness, and child neglect were the conditions noted most often. However, we did not have access to families' records, and we were therefore limited to reports of conditions by the referring agency. Additionally, these reports were incomplete and subject to differential caseworker reporting habits.

At the time of enrollment, children ranged in age from 1.7 to 21.4 months ($M = 10.1$, $SD = 6.0$). Sixty-nine of the children were male (58%). Seventy-three of the children were African American (61%), 25 were Biracial (20%), 13 were White/Hispanic (11%), and 9 were White/non-Hispanic (8%). Parents ranged in age from 15.7 to 47.0 years ($M = 28.4$, $SD = 7.8$). All parents were female, with the exception of 2 males (2%). Sixty-nine of the parents were African American (61%), 10 were Biracial (9%), 17 were White/Hispanic (15%), and 17 were White/non-Hispanic (15%). The majority of parents had not completed high school (68%).

Procedure

Participant recruitment—The research study had strong endorsement by the city's Child Welfare agency. Agencies contracted by the city's Child Welfare agency were encouraged to refer their clients to the study for treatment. We had informed agency staff about the

program and staff had been encouraged to use the intervention as a referral for their families. When parents were referred, research staff initially contacted them to describe the research protocol and the parent training sessions. If the parents were interested, a consent visit was scheduled in the parents' homes to describe the program in detail.

Pre-intervention and post-intervention assessments—Approval for the conduct of this research was obtained from the University of Delaware Institutional Review Board. In a first research visit, research staff explained the study to the parent and obtained consent. After consenting, parents were randomly assigned to receive either the Attachment and Biobehavioral Catch-up Intervention or a control intervention (Developmental Education for Families: DEF). The interventions were of the same duration and frequency. Intervention sessions were implemented in parents' homes at about weekly intervals. Approximately one month after completing the intervention sessions (or later for children who were not yet old enough), parents and their children participated in the Strange Situation at a research visit at the laboratory.

Interventions—For both interventions, parent trainers were hired who had experience with children and strong interpersonal skills. Parent trainers administered 10 training sessions according to a structured training manual. All sessions were videotaped, allowing assessments of fidelity to the manual. Sessions took place where parents were living, mostly in parents' homes, but sometimes at shelters. To the extent possible, the format, duration, and frequency of the interventions were similar for the two interventions.

Experimental intervention

Attachment and Biobehavioral Catch-up Intervention (ABC): The Attachment and Biobehavioral Catch-up Intervention was designed to enhance children's attachment organization. It was designed to help parents change in the following ways: provide nurturance when children are distressed both by re-interpreting children's alienating behaviors (sessions 1–2) and by over-riding their own issues that interfere with providing nurturing care (sessions 7–8); provide a sensitive, responsive environment by following the child's lead with delight when children are not distressed (sessions 3–4); and, behave in ways that are not frightening to children (sessions 5–6).

Sessions 1 and 2: Providing nurturance: Children that experience adversity early in life may fail to signal their needs clearly (Stovall & Dozier, 2000; Stovall-McClough & Dozier, 2004), making it difficult for parents to respond sensitively. During the first two sessions, the parent trainers helped parents see the importance of providing nurturance, even though their children may have been behaving in ways that pushed them away. Parent trainers presented videotapes of other parents and their children to demonstrate the challenges of responding to children whose behaviors suggest they do not need reassurance (i.e., children who turn away or are difficult to soothe). To further develop a rationale for providing nurturance, parent trainers described research evidence regarding the beneficial effects of receiving sensitive care. Gradually, parent trainers turned the discussion towards behaviors of the target child that made it difficult for the parent to respond sensitively. Most importantly, parents were encouraged and supported in responding to their children's distress in the moment throughout the remaining sessions.

Sessions 3 and 4: Following the lead with delight: Parents were also helped to provide children with a responsive interpersonal world by following their children's lead when children were not distressed. After the parent trainer presented the rationale for letting children "lead the dance" based on previous research (e.g., Barnard, Morisset, & Spieker, 1993), parents were videotaped during structured activities designed to purposefully pull for

parents' directive, controlling, or "teachy" behaviors. In session 3, these activities included playing with books with pullout shapes and later with blocks. In session 4, parents and children made pudding together. Parents were provided with ongoing positive feedback throughout the activities, especially at times when they followed their children's lead and took delight in their children's efforts. Video-feedback following the activities helped further consolidate their understanding of the skill and support their feelings of competence.

Sessions 5 and 6: *Frightening behavior:* Given that frightening parental behavior has been identified as a predictor of disorganized attachment (Schuengel et al, 1999), it seemed particularly important to help parents not engage in behavior that might be threatening. Session 5 targeted intrusive behaviors that might be overwhelming for children. Parent trainers helped parents notice subtle signals (e.g., turning away) shown by other children in videos whose parents behaved in intrusive ways, such as tickling or continuously putting a puppet in the child's face. Then, parents were given puppets and encouraged to play with their children while monitoring how their own behaviors may have been overwhelming or frightening toward the children. Again, ongoing commenting on parents' behaviors in the moment and through video feedback helped reinforce parents' understanding of the session content. In session 6, other frightening behaviors were discussed more explicitly, such as threatening looks, verbal threats (e.g., "If you do that again, you're going to get it!"), and harsh discipline. After discussing examples of these frightening behaviors shown by other parents, parent trainers asked parents to consider ways in which they were frightened by their own caregivers, as well as ways in which they may have been frightening to their own children. Parent trainers presented research evidence on the problematic effects on children of being frightened of their parents. Furthermore, parent trainers encouraged parents to consider ways in which they or their relationships with their own caregivers were negatively affected by similarly threatening experiences. Finally, parent trainers pointed out times during sessions when parents restrained from engaging in frightening behaviors, and gently challenged parents to recognize times when they showed frightening behaviors, both in the moment or through video clips.

Sessions 7 and 8: *Recognizing voices from the past:* Often, parents struggle to provide sensitive care when they did not experience sensitive care themselves (Kovan, Chun, & Sroufe, 2009; van IJzendoorn, 1995). In sessions 7 and 8, parent trainers helped parents recognize how their own issues and experiences with their caregivers may have interfered with their own comfort with providing nurturance, following their children's lead with delight, or not behaving in frightening ways. Leading up to these sessions, parent trainers developed a conceptualization of parents' strengths and weaknesses, and thus, were able to focus the discussion based on these observations. By becoming aware of their automatic ways of responding to their children ("voices from the past"), parents became better able to recognize when they responded in insensitive, controlling, and/or frightening ways. Finally, they were encouraged to "over-ride" these behaviors, replacing them with the skills from earlier sessions (i.e., providing nurturance, following the child's lead, showing delight, responding to children's signals). By commenting on ways that parents overrode their "voices from the past" during sessions, parent trainers further reinforced how parents were providing their children with the care that they never received themselves.

Sessions 9 and 10: *Consolidation of gains:* The topics of sessions 9 and 10 included the importance of touch and young children's emotions, respectively. However, the main aim of these final sessions was to further reinforce the three intervention targets: providing nurturance, following children's lead with delight, and not being frightening. Thus, parent trainers celebrated the parents' hard work by commenting on their sensitive behaviors

during these sessions, and presenting video clips as evidence of the changes parents made across the sessions.

Although each session had a specific topic, there were several techniques carried across sessions. Most importantly, parent trainers commented on parents' behavior throughout the sessions, as it related to the three intervention targets (i.e., providing nurturance, following the child's lead with delight, and not being frightening). This frequent and positive "in the moment" feedback was expected to reinforce skills and ideas being discussed, support the parents' efforts, and enhance the relationship between the parent and parent-trainer. In a similar way, structured activities (e.g., making pudding, playing with puppets) were used to help parents practice particular skills, with parent trainers scaffolding these activities by providing constructive feedback throughout the interactions. Throughout the 10 sessions, parent trainers also used video feedback to highlight parents' strengths, gently challenge parents' weaknesses, and celebrate changes in parents' and children's behaviors. In developing the rationale for particular sessions, parent trainers presented parents with information from past research. Finally, homework was assigned each week, typically involving assignments to practice the skills and record their observations of their own and their children's behavior throughout the week.

Control intervention

Developmental Education for Families (DEF): The Developmental Education for Families sessions was of the same duration (10 hour-long sessions) and frequency (weekly) as the Attachment and Biobehavioral Catch-up intervention. The educational intervention was borrowed partly from the home visitation component of the early intervention program developed by Ramey and colleagues (Ramey, McGinness, Cross, Collier, & Barrie-Blackley, 1982; Ramey, Yeates, & Short, 1984). This intervention was designed to enhance cognitive, and especially linguistic, development. The intervention has been successful in improving intellectual functioning when provided intensively and for a long duration in day care settings (Brooks-Gunn, Klebanov, Liaw, & Spiker, 1993). Components that involve parental sensitivity to child cues were excluded in our version of the intervention so as to keep the interventions distinct. Although the intervention is manualized, specific activities take into account child's developmental level.

Measures

Strange Situations—The Strange Situation (Ainsworth et al., 1978) is a laboratory procedure designed to allow assessment of children's reliance on the parent when they are distressed. The procedure takes about 20 minutes and includes two separations from and subsequent reunions with the parent.

Attachment behaviors (proximity seeking, contact maintenance, avoidance, and resistance) were coded during the reunion episodes, using criteria specified by Ainsworth et al. (1978). Children were classified as secure if they sought out contact with the parent directly and were soothed by the parent; as avoidant if they turned away from the parent or failed to look to the parent for reassurance; as resistant if they were not soothable despite moving toward the parent. In addition, children were classified as disorganized using criteria specified by Main and Solomon (1990). Children were classified as disorganized if they met the threshold for disorganized behaviors, which included: simultaneous display of contradictory behaviors; sequential display of contradictory behaviors; freezing or stalling; misdirected attachment cues (e.g., approached stranger when distressed); stereotypies or anomalous postures in the parent's presence; direct indices of apprehension regarding the parent (e.g., fearful expression when the parent returns); or direct indices of disorganization or disorientation (e.g., rapid changes in affect, disoriented wandering).

Two coders, blind to other study information, classified the videos. The primary coder (Initials omitted for blind review) had attended the 2-week course at the University of Minnesota and passed the reliability test (reaching at least 80% agreement with expert coders). The second of the two coders was Elizabeth Carlson, an expert in coding Strange Situations and, along with Alan Sroufe, the coding trainer for Strange Situations. Elizabeth Carlson coded 34% of the videos. The two coders agreed on 85% of the videos for 4-way classifications ($k = .74$), 92% of secure/insecure classifications, and 87% for organized/disorganized classifications ($k = .76$). Disagreements were resolved by conference. Alan Sroufe was called in to conference on those that were especially difficult.

At the time children participated in the Strange Situation, they were between the ages of 11.7 and 31.9 months of age ($M = 19.1$, $SD = 5.5$). The Strange Situation is typically used for children up to 24 months, but has been used in investigations with older children, including those up to 29 months of age. To ensure that any results were not attributable to our inclusion of older children in this study, we conducted analyses excluding children older than 24 months of age, in addition to analyses that included all children.

Results

Preliminary results

Randomization check—Of the children included in this study, 60 were randomly assigned to receive the ABC intervention, and 60 were randomly assigned to receive the control (DEF) intervention. Children randomly assigned to the ABC intervention did not differ significantly from children assigned to the DEF intervention with regard to age at enrollment, age at Strange Situation, gender, or minority status. Similarly, there were no group differences in parent age, parent education, or parent minority status. See Table 1 for summary of demographic information across intervention groups.

Attachment classifications—Fifty children (42%) were classified as secure (B), fourteen (12%) as avoidant (A), and 3 (2%) as resistant (C). Approximately half of the children (44%) were considered disorganized for analyses, including “D” children who met criteria for a disorganized classification ($n = 40$), “CC” children who were assigned to “cannot classify” ($n = 1$), and “D/CC” children who met the threshold for disorganized and “cannot classify” ($n = 12$). This approach for grouping children classified as disorganized and children classified as “cannot classify” has been used previously (e.g., Behrens, Hesse, & Main, 2007). Of the 40 children classified as disorganized, 52% received a secondary classification of secure (B), 25% received a secondary classification of resistant (C), and 23% received a secondary classification of avoidant (A). Attachment classifications were unrelated to child and parent demographic variables.

Primary results

Primary analyses examined intervention group differences in organized versus disorganized attachments using chi-square tests. Effect sizes are reported as Cohen’s d statistic, representing a standardized estimate of the magnitude of the observed group difference. Relative to children in the control intervention group, children in the ABC intervention group showed lower rates of disorganized attachments, $\chi^2(1,120) = 7.60$, $p < .01$. The effect size of this contrast was medium ($d = .52$). As can be seen in Table 2, 32% of the ABC children had disorganized attachments, whereas 57% of the DEF children had disorganized attachments. Similarly, children in the ABC intervention group showed significantly higher rates of secure attachment, relative to children in the DEF intervention group, $\chi^2(1,120) = 4.13$, $p < .05$. The effect size of this contrast was also medium ($d = .38$). Whereas 52% of children in the ABC intervention group had secure attachments, only 33%

of children in the DEF intervention group had secure attachments. These results remained significant when excluding children who were older than 24 months at the time of the Strange Situation, for attachment disorganization, $\chi^2(1,95) = 5.06, p < .05$ (effect size: $d = .47$), but not for attachment security, $\chi^2(1,95) = 1.85, p > .05$ (effect size: $d = .28$). The results also remained significant when excluding the second child of the 7 parents who had 2 children in the study, for both attachment disorganization, $\chi^2(1,113) = 8.58, p < .01$ (effect size: $d = .57$), and attachment security, $\chi^2(1,113) = 4.85, p < .05$ (effect size: $d = .44$).

Discussion

In the present study, parents involved with Child Protective Services due to high risk of maltreating their young children were randomly assigned to participate in the Attachment and Biobehavioral Catch-up Intervention or a control intervention. Relative to children of parents who received the control intervention, children in the Attachment and Biobehavioral Catch-up intervention group showed lower rates of disorganized attachment and higher rates of secure attachment. These findings are exciting given the nature of the sample (i.e., high risk for maltreatment and neglect), and given the mixed results of previous studies that have assessed disorganized attachment as an outcome of intervention (Bakermans-Kranenburg et al., 2005).

The results from the current study have high public health significance. Reducing the incidence of insecure and disorganized attachment classifications in infancy could possibly lower the incidence of later psychopathology and deviant behavior in later childhood and adolescence (Carlson, 1998; Lyons-Ruth et al., 1997), although causal connections have yet to be established. The Attachment and Biobehavioral Catch-up intervention was targeted, and relatively short-term, consistent with characteristics of interventions identified as most effective in previous meta-analyses (Bakermans-Kranenburg et al., 2003). Importantly, these characteristics will support the feasibility of dissemination into the community.

This study has several methodological strengths. First, the effectiveness of the intervention was tested through a randomized trial. Therefore, it can be ensured that the differences of children's attachment outcomes were causally related to the Attachment and Biobehavioral Catch-up Intervention. Second, all of the mothers in the current study had been previously identified as being at-risk of maltreating their children. Therefore, the results of this study seem generalizable to mothers and young children who receive child protective services and are at risk for abuse and neglect. Third, we used the Strange Situation Procedure to measure children's attachment classifications in this study. Given the strong psychometric properties and observational structure of the assessment, the Strange Situation Procedure has been considered the "gold standard" method for assessing children's attachment.

Potential Mediators of Intervention Effects

Findings from basic science research often inform prevention and intervention efforts; however, findings from intervention studies are likely just as critical in informing basic research in developmental psychopathology. Presumably, randomized control intervention studies manipulate key aspects of children's early experiences, allowing for systematic examination of causal associations between these early experiences (e.g., parenting behaviors) and children's development-associations that are typically only investigated non-experimentally. Similar to other intervention studies, the present study offers an important opportunity to experimentally investigate precursors of attachment insecurity and disorganization. As such, it will be important to examine mechanisms of therapeutic action in future studies. Identifying specific components of the Attachment and Biobehavioral Catch-up intervention that contributed to enhanced attachment organization will further inform research regarding the development of disorganized attachment among high-risk

families, and improve prevention and early intervention efforts. There are several possibilities regarding how changes in parenting behavior may have led to the observed differences in attachment organization. For example, maltreating parents and parents who have experienced unresolved trauma often behave in frightening ways with their children (Lyons-Ruth et al., 2005; Main & Hesse, 1990), with frightening parental behavior associated with disorganized attachment (Schuengel et al., 1999). To specifically target these issues, the Attachment and Biobehavioral Catch-up intervention incorporated strategies to help reduce mothers' tendencies to act in frightening ways toward their children. We expect that these explicit attempts to target frightening behavior were instrumental in reducing the incidence of disorganized attachment. Lyons-Ruth and colleagues (1999) have developed the AMBIANCE system for assessing atypical or disrupted maternal behaviors, such as frightened/frightening behavior, withdrawal, and intrusiveness/negativity. Given that several of these behaviors were targeted throughout the Attachment and Biobehavioral Catch-up intervention, follow-up studies can examine disrupted maternal communication as a potential mediator.

Similarly, it will be important to continue to examine specific aspects of early interventions that are critical to their effectiveness through meta-analysis. Whereas a number of characteristics of the Attachment and Biobehavioral Catch-up intervention are similar to other attachment-based interventions that have targeted disorganized attachment among high-risk families, such as the use of video feedback (e.g., Bakermans-Kranenburg et al., 2003; Egeland & Erickson, 1993; Moss et al., in press) and focus on sensitivity (Bakermans-Kranenburg et al., 1998; Egeland & Erickson, 1993; Heinicke et al., 1999; Lyons-Ruth et al., 1990; Moss et al., in press), other aspects of the Attachment and Biobehavioral Catch-up intervention are more unique, including the focus on decreasing frightening behavior, emphasis on commenting on parents' behaviors in the moment, and relatively brief nature.

Potential Moderators of Intervention Effects

An important step in efforts to further develop and disseminate interventions is to examine for whom they work and for whom they do not work. There are several potential moderators that may have influenced the effectiveness of the Attachment and Biobehavioral Catch-up intervention on enhancing attachment organization, which will be important to examine in future studies. First, characteristics of parents may have contributed to whether or not they responded to the intervention, such as former or current substance use, psychopathology, attachment state of mind, concurrent life stressors (e.g., homelessness, unemployment), and social support. Additionally, characteristics of children may have contributed to intervention effectiveness, such as temperament, behavior problems, or prenatal risk factors (e.g., substance exposure, pre-term birth). Finally, more complex interactions, such as matches between characteristics of parents and characteristics of children (e.g., temperamentally difficult child with insensitive parent) may have affected response to intervention. After identifying for whom the Attachment and Biobehavioral Catch-up intervention is most effective, dissemination efforts can be targeted towards those families. After identifying for whom the intervention was less successful, efforts can be made to enhance the Attachment and Biobehavioral Catch-up intervention with supplemental, perhaps more intensive, components or to identify alternative means of intervention.

Limitations and Conclusion

Despite a number of strengths, certain limitations should be considered when interpreting the results of this study. First, although all families were identified as being at risk for maltreatment, we did not have access to Child Protective Services records for the families. Therefore, we were not able to examine the relation of differing maltreatment histories to treatment effectiveness. Second, our use of the Strange Situation Procedure to assess

attachment beyond 24 months extends beyond the range for which the procedure has been validated. The Strange Situation has been validated for use with children between 12 and 18 months of age (Ainsworth et al., 1978), with some investigations extending this age to 24 months (e.g., Dozier et al., 2001; Steele, Murphy, & Steele, 2010; see Cyr et al., 2010). However, we conducted analyses with children who are between the ages of 12 and 24 months and found that our results held with that smaller sample. Finally, we did not examine possible effects of the comparison intervention: Developmental Education for Families (DEF). Given the emphasis on supporting cognitive and language development, we might expect to see effects on children's IQ, or receptive and expressive language skills. Additional data regarding these outcomes (e.g., vocabulary knowledge on the Peabody Picture Vocabulary Test, Dunn & Dunn, 1997) are being collected when children are 3 and 4 years old. However, these data were not available at the time of this report.

In conclusion, the results from the current study suggest that the Attachment and Biobehavioral Catch-up intervention is effective in promoting organized and secure attachment outcomes among a group of young children who are at risk for neglect. Building on previous research highlighting effective components of early intervention programs, the current program was short-term and focused on specific behavioral targets. In addition, issues that were unique to the mothers and children at risk for maltreatment (i.e., frightening behavior) were systematically targeted. This is particularly exciting given that several previous intervention attempts have either been ineffective or long-term. Despite these results supporting the intervention's efficacy, the more nuanced questions of how and for whom the intervention works remain to be addressed.

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Table 1

Demographic Information across Intervention Groups

Variable	Intervention Group	
	ABC (n = 60)	DEF (n = 60)
Child age (in months)	<i>M</i> = 19.2 (<i>SD</i> = 5.2)	<i>M</i> = 19.2 (<i>SD</i> = 5.8)
Child male	62%	53%
Child minority	93%	92%
Parent age (in years)	<i>M</i> = 29.0 (<i>SD</i> = 7.3)	<i>M</i> = 29.0 (<i>SD</i> = 8.7)
Parent minority	78%	81%

Table 2

Attachment Classifications across Intervention Groups

Variable	Intervention Group	
	ABC n (%)	DEF n (%)
Attachment Disorganization		
Organized	41 (68%)	26 (43%)
Disorganized	19 (32%)	34 (57%)
Attachment Security		
Secure	31 (52%)	20 (33%)
Insecure	29 (48%)	40 (67%)