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## Relational Interventions for Child Maltreatment: Past, Present, & Future Perspectives

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### Abstract

It is well established that child maltreatment has significant deleterious effects for the individual as well as for society. We briefly review research regarding the impact of child maltreatment on the attachment relationship, highlighting the need for relational interventions for maltreated children and their families to effectively thwart negative developmental cascades that are so often observed in the context of child maltreatment. Next, historical and contemporaneous perspectives on relational interventions for individuals with histories of child maltreatment are discussed with attention to the empirical evidence for and the current evidence-based status of several relationally based interventions for child maltreatment. Differential sensitivity to the environment is then discussed as a theoretical framework with important implications for interventions for individuals who have been reared in maltreating environments. Current research on neurobiology and maltreatment is then reviewed, with an emphasis on the need for future investigations on genetic variants, epigenetics, and the efficacy of relational interventions for maltreated children. We conclude with a discussion of the tenets of developmental psychopathology, their implications for relational interventions for child maltreatment, and recommendations for advancing the development, provision, and evaluation of relational interventions for individuals with histories of child maltreatment.

### Costs and Consequences of Child Maltreatment

Our understanding of the deleterious consequences of maltreatment, not only during childhood but also across the lifecourse, has burgeoned since Elizabeth Elmer first concluded that child abuse and neglect did not exert any negative effects on development over and above the influence of poverty (Elmer, 1979). Although well-intentioned, this conceptualization, which resulted from flawed methodology and subsequent erroneous interpretations (see Aber & Cicchetti, 1984, for a critique of Elmer's (1979) research), did much to delay our understanding of the longitudinal sequelae of child maltreatment and, unfortunately, also resulted in lags in the development, delivery, and evaluation of interventions that could deflect children from maladaptive pathways onto more positive developmental trajectories. These delays are particularly concerning given the costs associated with child maltreatment for both the individual and for society more broadly. In

2012, the costs of child abuse and neglect were estimated to be \$80 billion, with direct costs of over \$33 billion associated with the child welfare system, law enforcement, hospitalization, and mental/physical health care. Indirect costs included special education, juvenile delinquency, involvement in the adult criminal justice system, and lost work productivity (Gelles & Perlman, 2012). Given the extensive negative sequelae associated with child maltreatment, the magnitude of these costs is not surprising. A consensus now exists that child maltreatment exerts a broad impact across multiple domains of development, beginning at the time that the trauma occurs and, unless intervention or other protective factors are operative, extending into adulthood (see Cicchetti & Toth, in press).

Although a comprehensive review of the sequelae of child maltreatment is beyond the scope of this article, we highlight research on the development of attachment relationships that is particularly relevant to the provision and evaluation of relational interventions for children who have been maltreated (for more extensive reviews on the sequelae of maltreatment (see Cicchetti & Toth, 2005, in press; Cicchetti & Valentino, 2006). Following this review, we discuss historical and contemporaneous perspectives on relational interventions for individuals with histories of child maltreatment. We then highlight differential sensitivity to the environment as a theoretical model that can be useful in informing the provision and evaluation of relational interventions and discuss research on the biological consequences of child maltreatment that possess relevance for relational interventions. We conclude by reflecting on the tenets of developmental psychopathology that have been historically invoked in relation to intervention and offer recommendations for advancing the development, provision, and evaluation of relational interventions for individuals with histories of child maltreatment.

### **The Development of Attachment Relationships**

The development of attachment is particularly salient toward the end of the first year of life, when infants derive a sense of security from their caregivers and use these relationships as a secure base from which to begin to explore the broader environment (Bowlby, 1969/1982; Sroufe, 1996). During this period, parent-child interactions that are characterized by synchrony, sensitivity, and appropriate affective interchanges are associated with the development of secure attachments. If a caregiver is not seen as reliable and responsive, then the infants' ability to develop feelings of security in their primary attachment relationship is likely to be impeded (Cummings & Davies, 1996; Sroufe & Waters, 1977). Based on their relationship history, children subsequently form representational models of their caregiver, of themselves, and of themselves in relation to future relationship partners (Bowlby, 1969/1982; Bretherton, 1985; Crittenden, 1990). The development of secure attachment relationships is particularly important as it has been associated with numerous positive outcomes over the course of development, including positive emotional and behavioral functioning, academic success, effective peer relationships, and few behavior problems (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Cicchetti & Roisman, 2011; Moss & St-Laurent, 2001; Sroufe, 1983).

Although it was once believed that maltreated children did not form attachments with their primary caregiver, we now know that they do form attachments, but that the main issue

relates to the quality of these attachments and the subsequent representational models that emerge (Cicchetti & Toth, 2006). Research across laboratories has coalesced to demonstrate that rates of attachment insecurity and, in particular, disorganized attachment, for maltreated infants, toddlers, and preschoolers can be 80-90% or higher (Barnett, Ganiban & Cicchetti, 1999; Carlson, Cicchetti, Barnett & Braunwald, 1989; Cicchetti, Rogosch, & Toth, 2006; Lyons-Ruth, Repacholi, McLeod, & Silva, 1991). Moreover, these high rates of insecurity and disorganization exceed those observed in other high-risk groups of children (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010). Of particular relevance to prevention and intervention initiatives, insecure attachments in maltreated children tend to be stable, whereas secure attachments, when present in maltreated children, typically become insecure over time (Cicchetti & Barnett, 1991; Schneider-Rosen, Braunwald, Carlson, & Cicchetti 1985). Moreover, maltreated children are more likely than demographically comparable age-mates to develop negative representational models, including negative representations of themselves and of their caregivers (Pickreign Stronach, Toth, Rogosch, Oshri, Manly, & Cicchetti, 2011; Toth, Cicchetti, Macfie, & Emde, 1997; Toth, Cicchetti, Macfie, Maughan, & Vanmeenen, 2000).

Historically, many interventions for maltreatment focused exclusively on parenting, and the prevalent view was that if maltreatment ended, either through improved parenting or removal of the child from the maltreating environment, then adverse consequences to the child could be averted. However, based on extensive research, we now know that such interventions may fail to assist children in engaging more positive developmental trajectories. Thus, in view of the deleterious consequences of child maltreatment on attachment relationships and on representations of self and caregiver, the provision of relationally focused modes of intervention is particularly important if negative developmental cascades across the lifecourse are to be avoided (Cicchetti, 2011).

## Historical Origins of Relational Interventions

The origins of current relational interventions for child maltreatment can be traced back to research on the prevention of child abuse and neglect in the 1970s and 1980s. During that era, Helfer defined child abuse as “any interaction or lack of interaction between a child and his or her caregiver which results in non-accidental harm to the child’s physical and/or developmental state” (Helfer, 1982, p. 252). This early working definition made clear the relational nature of maltreatment, from which logically followed the need for relational interventions to treat and prevent further child maltreatment. An additional factor influencing the work on relational interventions for child maltreatment during this time period was the emergence of attachment theory (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982), which documented and emphasized the importance of the early child-parent relationship for promoting normative child development. It was in this historical context that prevention science began to acknowledge the association between improving the parent-child relationship and decreasing the risk for child abuse and neglect, as well as for reducing the negative sequelae accompanying child maltreatment (Toth, Pianta, & Erickson, 2011).

Several of the early relational interventions utilized a coaching or modeling approach (Bristol, Wilson & Helfer, 1985; Cullen, Zeller, & Smith, 1985; Helfer & Wilson, 1982) or trained home professional or paraprofessional visitors (Barth, 1991; Gray, Cutler, Dean, & Kempe, 1979; Kempe, 1976; Larson, 1980; Olds, Henderson, Chamberlin, & Tatelbaum, 1986) to improve the parent-child relationship in an effort to prevent child abuse and neglect. A few of these early home-visiting programs for high-risk families were seminal in contributing to the development and utilization of relational interventions for child maltreatment. For example, Fraiberg and colleagues' (1975) "psychotherapy in the kitchen" should be highlighted for its intensive focus on the mother-child relationship. In this psychoanalytically based treatment, therapists worked with parents who had their own histories of severe abuse and neglect to understand how their trauma histories were adversely impacting their current relationship with their child. Through weekly sessions in the family's home, the therapist strove to build a strong relationship with the parent in order to elucidate how the "ghosts" from her own past were impacting their current interactions with their young child. Success at improving the parent-child relationship with individual cases (Fraiberg, Adelson, & Shapiro, 1975) led to the development of a standardized treatment based on this work that is used in modern practice, Child-Parent Psychotherapy (CPP), which will be discussed later in this article.

Project STEEP (Steps Toward Effective, Enjoyable Parenting; Egeland & Erickson, 1993) was one of the earliest reported randomized control trials of a relational intervention for families with multiple risk factors for maltreatment. STEEP had strong roots in attachment theory, and involved biweekly home visits beginning during the second trimester of pregnancy and continuing until the child's first birthday. STEEP home visitors used videotaped interactions of parent and child to encourage parental sensitivity and better understanding of the quality of the interactions within the dyad. STEEP was also influenced by Fraiberg's previously described therapeutic approach, and aimed to rework parental representations of their own caregivers that were interfering in the current parent-child relationship. Although significant differences between the intervention and control groups with respect to child attachment were not found in this initial trial (Egeland & Erickson, 1993), mothers in the STEEP program were found to have a better understanding of child development and greater sensitivity to their child's cues and signals (Egeland & Erickson, 2004). Furthermore, STEEP set the stage for increased scientific rigor in evaluating relational interventions for child maltreatment when this program of research was in its formative stages. The program evaluators were not deterred by these early findings and worked to modify STEEP to increase its ability to improve security of attachment (Egeland & Erickson, 2004). The current version of the STEEP program will be discussed below.

Fraiberg's "psychotherapy in the kitchen" and STEEP were foundational for the program of research on relational interventions for child maltreatment that emerged during the late 20<sup>th</sup> century. However, it is important to note some limitations of several of the early relational interventions for child maltreatment. For example, Martin (1984) recommended making the interaction between parent and child a primary focus of intervention, but believed that the specific treatment methodology was not of importance, thus highlighting the infancy of relational interventions during the early to mid 1980s. Additional limitations to many of the early research studies included the ongoing modification of interventions during the

evaluative trials, lack of standardized or manualized treatment, inadequate comparison groups, and informal evaluations without rigorous scientific methodology, such as random assignment to groups or adequate sample size. Thus, it was difficult to draw firm conclusions from much of this early research. Nonetheless, the theoretical foundations for relational interventions for child maltreatment were laid through this period of development and were seminal to providing the groundwork for contemporary research in the field.

## Current Relational Interventions

By the end of the 20<sup>th</sup> century, home visiting had become a popular method of treatment delivery for the prevention of child abuse and neglect (Guterman, 1997; Leventhal, 1996; Stevenson, 1999). However, programs varied in the extent to which they explicitly focused on improving the parent-child relationship in addition to providing parental support, concrete needs support, and/or parenting education (see Guterman, 1997 for a review of early programs). As the field of psychotherapy has moved towards manualized, evidence-based treatments, a number of systematically designed and implemented home-visiting programs have emerged for the prevention of child abuse and neglect, and this variability in treatment focus continues to be present (see Bilukha et al., 2005, Howard & Brooks-Gunn, 2009 for reviews). In this article, we focus on a selection of home-visiting interventions with a primary and consistent *relational* focus and theoretical orientation for preventing and addressing the sequelae of child maltreatment, including CPP (Lieberman & Van Horn, 2004), Attachment and Biobehavioral Catch-Up (ABC; Dozier, 2003; Dozier, Peloso, Lewis, Laurenceau, & Levin, 2008), Promoting First Relationships (PFR; Kelly, Zuckerman, Sandoval & Buehlman, 2008), a brief attachment based intervention (Moss, Dubois-Comtois, Cyr, Tarabulsy, St-Laurent, & Bernier, 2011), and a modification of the STEEP program (Erickson & Egeland, 2004). Additionally, we highlight a number of relationally oriented interventions for child maltreatment that do not employ a home-visiting strategy, including Circle of Security (COS; Cooper, Hoffman, & Powell, 2003), Parent-Child Interaction Therapy (PCIT; Chaffin et al., 2004), Interpersonal Psychotherapy (IPT; Klerman, Weissman, Rounsaville, & Chevron, 1984; Weissman, Markowitz & Klerman, 2000), and Interpersonal Psychotherapy for adolescents (IPT-A; Moreau, Mufson, Weissman, & Klerman, 1991; Mufson, Moreau, Weissman, & Klerman, 1993; Mufson, Moreau, & Weissman, 1996).

For each of the relational interventions discussed below, we also provide information regarding the current evidence-based status of the intervention. Treatments will be designated as well-established treatments or probably efficacious treatments using the criteria for empirically-validated treatments set forth by Chambless et al. (1998). More specifically, to meet the criteria for a well-established treatment, a) at least two between group experiments must demonstrate the specified treatment's superiority when comparing the treatment to a pill, psychological placebo or another active treatment or demonstrate the specified treatment's equivalence to an already established treatment; OR b) a large series of well designed single case design experiments must demonstrate the specified treatment's superiority compared to another treatment (pill, psychological placebo or another active treatment).

To meet the criteria for a well-established treatment, the specified treatment must also have been conducted with a manual, the client sample characteristics must be delineated, and the treatment's efficacy must have been independently replicated by a second investigative team. A probably efficacious treatment designation is made if a treatment a) meets all of the criteria for a well-established treatment with the exception of independent replication; b) has support of two or more experiments demonstrating that the treatment is superior to a wait-list control condition, or c) has a small series of well-designed single-case design experiments meeting the other criteria for single-case design described above. Treatments that do not meet the criteria set forth to receive a designation of well-established or probably efficacious but have some research evidence suggesting their utility with maltreated children (e.g. a pre-post treatment study with no comparison group) will be considered "promising" treatments that are in need of additional research.

CPP is an exemplar of a contemporary evidence-based, relational treatment designed to intervene in and prevent child maltreatment via home visitation. CPP was developed out of Fraiberg's "psychotherapy in the kitchen" intervention with parents and their infants, described above (Fraiberg, 1980; Fraiberg et al, 1975). This intervention was elaborated upon by Lieberman and colleagues (Lieberman & Van Horn, 2004; Lieberman & Van Horn, 2008). Although it was originally based on psychoanalysis and attachment theory, its modern form has been influenced by developmental psychopathology, cognitive behavioral therapy, stress and trauma work, and social learning theory (Lieberman & Van Horn, 2008).

CPP is intended for parents and their children aged birth to five years. An important feature of CPP is that the therapist's focus is on neither the parent nor the child individually, but rather on the relationship between the two, emphasizing the relational nature of this intervention. The therapist meets with the caregiver-child dyad during weekly, 60-minute sessions, often held in the family's home. Treatment typically lasts for approximately 10-12 months, although flexibility in duration is possible. Spontaneous play, conflict, and other interactions between the parent and child are utilized to explore and elucidate areas for growth in the parent-child relationship. The therapist provides a voice for the child when appropriate, fostering increased parental understanding of the child's needs, wishes and fears, and modeling appropriate behavior in relation to the child. Simultaneously, the therapist helps to offer a voice to the parent's own needs, wishes, and fears, particularly those relating to the parenting he or she received as a child and how those early experiences impact the nature of the current relationship with his or her own child. Thus, CPP offers direct support for improving the parent-child relationship in its natural context, while also providing a corrective emotional experience for the parent and an opportunity for her to rework representations of self and other.

CPP has been found to be effective at promoting attachment security in maltreated toddlers (Cicchetti et al., 2006), positive self-representations in maltreated preschoolers (Toth et al., 2002), and decreasing behavioral problems and trauma symptoms in preschool children exposed to domestic violence (Lieberman, Ghosh Ippen & Van Horn, 2006; Lieberman, Van Horn & Ghosh Ippen, 2005). Interestingly, when compared with a parenting education model, both CPP and the non-relational intervention were found to be equally efficacious in fostering secure attachment and in reducing disorganized attachment in infants from



maltreating families (Cicchetti, Rogosch, & Toth, 2006). However, when examining the sustained efficacy of these models of intervention, only CPP was found to be efficacious in promoting security of attachment over time (Pickreign Stronach, Toth, Rogosch, & Cicchetti, 2013). These results suggest that in cases of extremely maladaptive parenting, more intensive models of intervention that go beyond parent skills training may be necessary.

In summary, multiple well-controlled randomized trials support the efficacy of CPP as a relational intervention for young maltreated children and their parents. CPP meets criteria established to determine whether an intervention can be classified as evidence-based (Chambless et al., 1998). Specifically, it has been evaluated in randomized control trials by at least one group not involved in its development, it is manualized, and it has demonstrated sustained efficacy over a period of one year post-intervention.

ABC is another intervention for young maltreated children and their caregivers with a strong relational orientation (Dozier, 2003; Dozier et al., 2008). ABC was developed based on attachment theory, and its main therapeutic goal is to enhance parental sensitivity and increase child attachment security in families with multiple risk factors or for children who have been placed in foster care due to maltreatment (Bernard, Dozier, Bick, Lewis-Morraty, Lindhiem, & Carlson, 2012; Dozier, 2003; Dozier, Peloso, Leiw, Laurenceau & Levine, 2008). The ABC intervention is delivered in 10 joint parent-child sessions provided in the home. It is built around encouraging the parent to continue providing sensitive caregiving when children are distressed, and despite a parent's own issues or concerns, avoiding frightening behavior and following the child's lead when s/he is in a calm state (Bernard et al., 2012). A recent randomized control trial comparing ABC to a developmental education intervention of the same duration found that children in the relationally based ABC treatment had higher rates of secure attachment post-treatment compared to the young children in the developmental education intervention (Bernard et al., 2012). ABC currently meets criteria for a probably efficacious treatment as its efficacy has not yet been demonstrated by a second research team; however, replication is currently underway.

Another relational intervention for young children (aged 1 to 5 years) who have experienced maltreatment was developed by Moss and colleagues (2011). This "Program in Relational Intervention" is similar to CPP and ABC, as caregivers and children are met with dyadically in this brief (eight, 90-minute sessions) attachment based intervention. An important feature of this treatment, differentiating it from the two previously discussed, is the use of immediate video-feedback of play sessions structured by the therapist as a way to foster improved parental understanding of the interactions between parent and child, thereby increasing maternal sensitivity. The attachments of children who received this intervention were more likely to change from insecure or disorganized to secure, compared to the children in the comparison condition (Moss et al, 2011). These results provide further evidence for the efficacy of this relational intervention for young maltreated children, and it meets criteria for a probably efficacious treatment as its efficacy has not yet been replicated by an independent investigator or team.

PFR, a 10-week home-based intervention, was also designed for young maltreated children and their caregivers as a way to focus on and improve the child-caregiver relationship (Kelly et al., 2008). Developed in the late 1990s, PFR aims to facilitate deeper caregiver understanding of the child's needs and emotions and how these are related to the challenges in the child-caregiver relationship. PFR utilizes video-feedback as a means of focusing the intervention, similar to Moss et al.'s (2011) brief intervention and STEEP. In PFR, this "reflective video feedback" is utilized to facilitate the parent's ability to correctly interpret child cues and emphasize parent strengths (Speiker, Oxford, Kelly, Nelson, & Fleming, 2012). Similar to the ABC intervention, PFR addresses the concern that children who have had multiple caregivers due to their involvement in the child welfare system may give confusing signals, preventing the child from eliciting the nurturing response that they are seeking from their caregiver (Speiker et al., 2012).

To date, there has been one randomized control trial of PFR, which included 210 children between the ages of 10 and 24 months and their caregivers, including foster parents, biological parents or other adult relatives (Speiker et al., 2012). Post-intervention, caregivers in the PFR condition had greater improvements in sensitivity and understanding of toddlers' social and emotional needs than those in the educational comparison condition; caregivers in the PFR condition also reported greater child competence post-intervention (Speiker et al., 2012). However, no changes were observed post-intervention or at the 6-month follow-up on child attachment security as assessed with the Toddler Attachment Sort-45 (Speiker et al., 2012). More research is needed on this relational intervention for very young children and their caregivers to determine whether it impacts child attachment security. PFR, also in need of replication by an independent investigator, meets criteria for a probably efficacious treatment.

The aforementioned relational interventions for child maltreatment have strong roots in attachment theory and are devised for children in their early years of life and their parents. Alternatively, PCIT is a relational intervention for child maltreatment that also has roots in attachment theory, but is primarily based on social learning theory and employed with children pre-school aged and older (Chaffin et al, 2004; Thomas & Zimmer-Gembeck, 2011). It was originally developed for children ages 2 to 7 with disruptive behavior disorders, but it has been modified for use with physically abusive families and older children and their parents.

The overarching goal of PCIT is to stop physical abuse by improving parent-child interactions, teaching parenting skills, encouraging effective alternatives to physical discipline, and interrupting coercive cycles between parent and child (Chaffin et al., 2004). This intervention differs from parenting programs that work with parents in didactic groups separately from their children (e.g., Webster-Stratton's, 2000, Incredible Years curriculum). Importantly, during PCIT, the therapist meets with parents and children together during approximately 12-14 dyadic sessions, promoting skills in vivo, similar to the relational interventions for child maltreatment described above (Chaffin et al., 2004). In a randomized control trial for children ages 4 to 12 and their parents comparing PCIT, PCIT plus enhanced individualized services, and a standard community group, PCIT emerged as superior to the standard community group for preventing new reports of physical abuse over more than a



two year follow-up period (Chaffin et al., 2004). Enhanced PCIT did not improve the effects of basic PCIT, and interestingly, there was not a significant difference in new reports of abuse between the community group and enhanced PCIT (Chaffin et al., 2004).

Results of this seminal study of PCIT to prevent child abuse suggest that PCIT alone is an effective relational intervention to reduce re-reports of physical abuse of school-aged children; groups did not differ on re-reports of neglect in this study (Chaffin et al., 2004). More recent research with PCIT has demonstrated that increases in positive parental responses and decreases in negative parental responses occur early in the implementation of PCIT (Hakman, Chaffin, Funderburk & Silovsky, 2009), and increases in parental sensitivity from pre- to post-intervention also have been reported (Thomas & Zimmer-Gembeck, 2011). Furthermore, PCIT has been found to reduce child behavior problems in children ages 2 to 8 years old with histories of maltreatment (including physical abuse, sexual abuse, and neglect) using a pre-post design (Timmer, Urquiza, Zebell, & McGrath, 2005) and in children at risk for maltreatment compared to a wait-list control group (Thomas & Zimmer-Gembeck, 2011).

Similar to ABC and PFR, PCIT also has been used to promote the foster caregiver-child relationship for children who have been maltreated and was found to be effective in reducing child behavior problems in this population using a pre-post design (Timmer, Urquiza & Zebell, 2006). Recent research has successfully implemented PCIT in community settings with families at risk for maltreatment, where PCIT was found to reduce future child welfare reports (Chaffin, Funderburk, Bard, Valle, & Gurwitch, 2011). In summary, PCIT has been shown to reduce the risk for re-report of child physical abuse, decrease child behavior problems, and increase parental-sensitivity; this treatment can be used with biological and foster caregivers and has been successfully extended out of the lab and into a community setting. PCIT is a well-established treatment for child conduct disorder and can be considered a probably efficacious treatment for maltreated children and their parents at this time, given that only one randomized control trial to date (Chaffin et al., 2004) has compared PCIT to another treatment condition.

The STEEP program, which continues to espouse a strong relational orientation, has been modified from its original format to extend to the child's second year of life (Egeland & Erickson, 2004). The STEEP program bears resemblance to Moss and colleagues' (2011) brief attachment based intervention and to PFR in its use of videotaping to highlight the centrality of the parent-child relationship during treatment. Similarities between CPP and STEEP include a focus on providing a corrective emotional experience for the parent through her relationship with the facilitator and working with the parent on her own working models of relationships. STEEP can also be considered a promising relational intervention for child maltreatment. A randomized control trial demonstrating STEEP's efficacy compared to an active control condition (psychological placebo or another treatment) would promote STEEP to a probably efficacious treatment.

Another relational intervention devised for families at risk of child abuse or neglect is the Circle of Security (COS; Cooper et al., 2003; Hoffman, Marvin, Cooper & Powell, 2006). Similar to those described above, COS was developed out of principles of attachment

theory. However, COS differs in that parents and children are not seen dyadically. Instead, caregivers of children between the ages of 1 and 5 meet in small groups for 20 sessions where they watch and discuss video-recorded interactions between each caregiver and their child, thereby imparting a relational focus to this intervention. Parents also are provided with psychoeducation about attachment theory as they meet to discuss each individual caregiver's attachment relationship with their child and areas for growth and change in order to promote a secure attachment. In a study of 65 dyads, Hoffman et al. (2006) found significant change from disorganized to organized (including secure, insecure-avoidant, and insecure-ambivalent) attachment in children who had parents receiving COS. Of note, a comparison group was not available in this study; thus, COS can be considered a promising treatment for children at risk for child abuse and neglect and more research is needed to determine its efficacy with this population.

As our review demonstrates, the majority of relationally-based interventions for child maltreatment have been developed for use with young children. Alternatively, IPT (Klerman et al, 1984; Weissman et al, 2000) and the adaptation of IPT for adolescents (IPT-A; Moreau et al, 1991; Mufson et al, 1993; Mufson et al, 1996) are relational interventions for the treatment of depression in adolescents and adults that are increasingly being used with individuals who have experienced maltreatment, including histories of childhood sexual abuse (Bleiberg & Markowitz, 2005; Gamble, Smith, Poleshuck, He, & Talbot, 2011; Talbot et al., 2011; Toth, Rogosch, Oshri, Gravener, Sturm, & Morgan-López, 2013). IPT is a manualized treatment (Klerman et al, 1984; Weissman et al, 2000) that focuses on an individual's current social and interpersonal functioning in relation to mood symptoms, and concentrates on one of four problem areas: role transitions, interpersonal conflict, grief and loss, or interpersonal deficits, also referred to as interpersonal sensitivities (Weissman et al, 2000).

Adaptations have been made for the use of IPT with individuals who have experienced trauma. One such modification involves focusing on the interpersonal sequelae of trauma, such as difficulty trusting others, and how past trauma experiences are impacting current relationship functioning (Bleiberg & Markowitz, 2005). Talbot and colleagues developed an additional IPT focus area, interpersonal patterns, for use with individuals with a history of childhood sexual abuse (Talbot & Gamble, 2008; Talbot et al., 2011). The purpose of this focus area is to address trauma-related patterns and to help clients understand how these patterns exert a harmful impact on their current relationships in unwanted ways.

In a pilot study of IPT for individuals who had experienced trauma, including those with histories of childhood sexual and physical abuse, Bleiber and Markowitz (2005) reported clinically and statistically significant reductions in PTSD symptoms after the short-term IPT intervention. A randomized effectiveness trial comparing IPT to usual care for women with depression and histories of childhood sexual abuse found greater reduction in PTSD symptoms, shame, and depressive symptoms in the group receiving IPT (Talbot et al., 2011), as well as improved relationships with immediate family members compared to the usual care group (Gamble et al., 2011), further supporting the efficacy of this relational intervention for treating the sequelae of childhood maltreatment. In a recent randomized controlled trial to treat depression, Toth and colleagues compared IPT to enhanced

community standard treatment in a sample of depressed women with high rates of trauma (e.g., 30% reported having been raped or sexually assaulted by a relative) (Toth et al., 2013). Women in the IPT condition experienced significantly greater reductions in depressive symptoms compared to those in the enhanced community standard condition.

Taken together, these two studies suggest that IPT can be considered a well-established treatment for depressed women with histories of abuse. However, despite these promising findings, a recent study that included over 200 adults with major depressive disorder found that individuals with a history of child maltreatment benefitted more from antidepressant medication or cognitive behavioral therapy than from IPT (Harkness, Bagby, & Kennedy, 2012). Regardless of the type of treatment provided, individuals with histories of child maltreatment were more likely to experience future depressive episodes than were those without histories of maltreatment.

IPT-A has been used to treat depression in samples that included adolescents with trauma histories (Mufson, Dorta, Olfson, Weissman, & Hoagwood, 2004; Santor & Kusumakar, 2001), and Mufson and Sills indicate that “additional techniques may be included to deal with...sexual or physical abuse” during the course of IPT-A (Mufson & Sills, 2006, pp. 433). No study to date has explicitly adapted IPT-A for adolescents with maltreatment histories; thus, IPTA may be a promising intervention for maltreated children and is in need of additional research attention. An RCT evaluating the efficacy of IPT-A for the prevention of depression in adolescent girls with and without histories of child maltreatment is currently underway at Mt. Hope Family Center. The provision of intervention during the adolescent period may be critical in preventing further entrenchment of maladaptive interpersonal patterns resulting from childhood maltreatment. Intervention during this period is particularly important because adolescence is a transitional turning point in biological and psychological development that presents opportunities and challenges for adolescents as they embark on resolving the stage-salient issues of initiating close same-sex friendships, developing an identity, and forming romantic relationships (Cicchetti & Rogosch, 2002; Masten & Coatsworth, 1998; Schulenberg, Sameroff, & Cicchetti, 2004).

Although our discussion supports the availability of evidence-based, relationally-informed models of intervention for individuals with histories of child maltreatment, it also highlights the fact that much more work remains to be done in this area. Therefore, while acknowledging the important advances in developing, providing, and evaluating relationally-based models of intervention that have been made by theoreticians, researchers, and clinicians, it is equally important to recognize important advances that have been made in the field with respect to understanding the effects of maltreatment on neurobiological processes. Thus, we next turn to this emerging body of research and examine its implications for contributing to the next generation of relationally-based interventions.

### **Future Directions**

When contemplating future directions necessary for contributing to the development and evaluation of relationally-informed interventions for individuals with histories of child maltreatment, underlying theoretical perspectives are important to consider. In this regard,

differential susceptibility to the environment (Belsky, 1997a; Belsky, 2005; Ellis, Boyce, Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2011) emerges as a guiding influence.

## Differential Susceptibility to the Environment

Individual differences in biological reactivity to stress are thought to interact with the early environment to predict psychological well-being. Historically, the prevailing view of human development in the context of stressors has been explained by the Diathesis-Stress model (Falconer, 1965; Gottesman & Shields, 1967). In this dual-risk perspective, some individuals are considered to be inherently more vulnerable or predisposed (diathesis) to developing psychological disorders when placed in the context of environmental triggers (stress).

In efforts to move beyond the Diathesis-Stress model to understand the role of organismic characteristics in contributing to an individual's response to both *positive* and *stressful* contexts, two evolutionary accounts emerged in tandem (Ellis et al., 2011). Based on early studies of naturally occurring environmental adversities and biological reactivity as predictors of illness in young children, Boyce and colleagues (1995; Boyce & Ellis, 2005) advanced the concept of "biological sensitivity to context" (BSCT). The "differential susceptibility hypothesis" that emanated from this research posited that children differ in their susceptibility to environmental influences, with respect to the possibility of either positive or negative outcomes. "Differential Susceptibility Theory" (DST) emerged in response to the question of "Why are some children affected differently by exposure to the same rearing experience?" (Belsky, 1997; 2000). Although BSCT and DST were developed independently and differ in some important respects, they have much in common that possesses considerable relevance for the design, provision, and evaluation of interventions for individuals who have been reared in deleterious environments. Stated simply, both models posit that individuals who are the most adversely affected by stressors may also be the same ones who derive the *greatest benefit* from supportive and enriching environments (Belsky, 1997; Belsky & Pluess, 2009; Ellis et al., 2011).

The similarities between BSCT and DST have been articulated in a Special Section of *Development and Psychopathology* devoted to "Differential Susceptibility to the Environment", a term which captures the shared concepts of these models (Ellis et al., 2011). Both models: 1) are based on an evolutionary analysis of development that maintains that humans differ in their susceptibility to environmental influences; 2) believe that individuals *should* differ in their genetic and neurobiological susceptibility to context; 3) acknowledge that differential susceptibility can vary across development; 4) define susceptible individuals as experiencing *enduring* developmental change in response to exposure to positive or negative contexts; and 5) assert that neurobiological sensitivity to the environment can be *both* positive and negative. From an evolutionary-developmental standpoint, both models suggest that differential susceptibility to heterogeneous environments is maintained through the production of diverse offspring (Ellis et al., 2011).

Because a single phenotype cannot be adapted to all potential conditions, the creation of variability within families increases the probability that at least some offspring will be successful in every generation (Belsky & Pluess, 2009). Therefore, differential susceptibility

to the environment presumes that individuals vary in their susceptibility to context as a result of genetic differences. In regards to intervention research, differential susceptibility to the environment provides a possible explanation for individual variability in responsiveness to treatment. This is particularly important as most treatment outcome studies, even when yielding statistically significant effects and having medium to large effect sizes, include many individuals who do not benefit from the intervention. Thus, identifying differential susceptibility markers is key to tailoring treatments to uniquely fit individual differences. As such markers are identified, they may be examined as potential moderators of relational intervention outcomes.

Although not provided specifically to maltreating populations, a number of studies have been conducted that have considered the relevance of differential susceptibility to the environment with respect to relationally-informed interventions. In an examination of low birth weight infants and parents who received a broad array of early intervention services, only infants high in negative emotionality derived benefit from the intervention (Blair, 2002). Work by Van Zeijl and colleagues (2007) has demonstrated a moderating effect of child temperament on the association between maternal discipline and childhood externalizing problems. An additional study by this group evaluated an attachment theory based intervention for 1-3 year old children designed to reduce elevated externalizing behavior problems (Van Zeijl et al., 2006). Although the intervention was efficacious, no outcome differences emerged between children with and without difficult temperaments.

Klein Velderman and colleagues (2006) provided an attachment-based intervention, Video-Intervention to promote Positive Parenting (VIPP), to first-time mothers and their infants. Their findings indicated that increases in maternal sensitivity as a result of the intervention were only associated with increases in attachment security for highly reactive infants. That is, infants with the most difficult temperaments derived more benefit from VIPP than did less difficult infants. In a more recent RCT of a brief attachment-theory informed intervention modeled after the Circle of Security intervention, Cassidy and colleagues (2011) did not find a direct effect of treatment on the rate of secure attachment in irritable infants and their economically stressed mothers. However, after conducting separate analyses for maternal attachment style, beneficial intervention effects emerged for highly irritable infants. That is, among mothers with dismissing attachment styles, highly and/or moderately irritable infants were more likely to achieve secure attachment following the intervention when contrasted with infants in the comparison group. For mothers with preoccupied attachment styles, beneficial effects of the intervention occurred only for moderately irritable infants. Taken together, the results of these two studies support the emerging body of research that demonstrates that children with negative temperaments are more likely than those with milder temperaments to benefit from positive rearing experiences (Cassidy et al., 2011). It therefore appears that the interaction between maternal attachment and infant temperament should be considered when assessing the likelihood of positive outcome effects of relationally-based interventions.

Given these intriguing findings, we next discuss investigations of Gene x Environment interactions that provide evidence for differential susceptibility to the environment with respect to child maltreatment and that may have implications for relational interventions. For

a more extensive review of additional markers of differential susceptibility, see Belsky & Pluess (2009) and Ellis et al. (2011).

## NEUROBIOLOGY OF MALTREATMENT

### Gene X Environment Interactions

**Serotonin Transporter Gene**—Although not everyone agrees (see, for example, compare Caspi et al., 2010, and Karg, 2010; vs. Risch et al., 2009), the serotonin transporter gene, *5-HTT*, has been associated with depression, anxiety, and PTSD in intervention with maltreatment, stress, and trauma (Caspi et al., 2003; Feder, Nestler, & Charney, 2009; McCrory, De Brito, & Viding, 2010). A polymorphism in the linked promoter region (*5-HTTLPR*) of the gene results in a variation of either the short (s) or long (l) allele (Lesch et al., 1996). Because the short allele is dominant, individual genotypes may be categorized as either homozygous dominant (s/s), homozygous recessive (l/l), or heterozygous (s/l). In particular, the short allele of *5-HTTLPR* is associated with decreased serotonin transporter availability, which results in decreased reuptake of serotonin at the synapse (Feder et al., 2009).

*5-HTTLPR* has been shown to moderate the association between child maltreatment and adult depression when individuals possess at least one short allele (Brown et al., 2012; Caspi et al., 2003; see Kaufman et al., 2004, 2006, for similar results for children in foster care who have experienced maltreatment). Taylor and colleagues (2006) found that individuals with the s/s genotype were at greater risk for depression if they experienced an early adverse environment; however, those with the s/s variant who grew up in supportive environments had a significantly reduced risk for depression. Therefore, the s/s genotype appears to be a risk factor in the face of adversity, but a protective factor under supportive conditions. These GxE results provide support for differential sensitivity to the environment. Similarly, *5-HTTLPR* has also been associated with resilient functioning in children. In a study of low-income urban youth, nonmaltreated children with the s/s genotypic variant were significantly more likely to exhibit higher resilient functioning (Cicchetti & Rogosch, 2012). However, consistent with the differential sensitivity perspective, maltreated children with the s/s genotype were significantly lower than their peers on resilient functioning.

Recent studies also have investigated the interaction of *5-HTTLPR* and childhood adversity on the development of antisocial behavior. Cicchetti, Rogosch, and Thibodeau (2012) found that maltreated children in all of the genotype groups were significantly higher in self-reported antisocial behavior than nonmaltreated children. However, the strength of the differences between maltreated and nonmaltreated children varied. The greatest differentiation in antisocial behavior was seen among children with the s/s genotype, whereas those with the l/l genotype exhibited the smallest differentiation. Furthermore, adult ratings of delinquent behavior in maltreated and nonmaltreated children were significantly higher for maltreated children in the s/s and s/l groups, but not for those in the l/l group, indicating a possible protective effect of the l/l genotype. Another investigation by Li and Lee (2010) found that *5-HTTLPR* and maltreatment were related to antisocial behavior for girls, but not for boys. The authors classified antisocial behavior into one of three groups: exclusive covert (e.g., non-explicit behavior), mixed covert and overt, and no problems.



Results indicated that maltreated girls who were homozygous for the s/s alleles were 12 times more likely to belong to the exclusive covert than the no problems group.

Few studies to date have investigated the association between genetic variation and efficacy of a relational intervention. Cicchetti, Rogosch and Toth (2011) examined the extent to which polymorphisms of the serotonin transporter linked promoter region (5-HTTLPR) gene differentially influenced the development of attachment security and disorganization in maltreated and nonmaltreated infants at age 13 months, and the extent to which the efficacy of preventive interventions to promote attachment security were influenced by genetic variation. Maltreated infants and their mothers were randomly assigned to one of three intervention groups: CPP, psychoeducational parenting intervention (PPI), or community standard (CS). Attachment status was determined via the Strange Situation (Ainsworth et al., 1977) procedure when children were approximately one-year old and was reassessed post-intervention at age 2.

At baseline, high rates of disorganized attachment were observed in the three maltreated groups compared to the nonmaltreated group and both the CPP and PPI interventions resulted in increased rates of attachment security at age 2. Genetic variation did not influence improvement in attachment organization among maltreated infants. In contrast, among nonmaltreated infants, 5-HTTLPR polymorphisms influenced attachment security and disorganization at age 2 and the stability of attachment disorganization over time. These results suggest that maltreatment and the high percentage of disorganized attachment in maltreated infants may have overridden any potential genetic effects. CPP and PPI interventions proved efficacious, irrespective of genetic variation in the maltreated children.

Further research is needed to evaluate the relationship between genetic variants and the efficacy of relational interventions for maltreated children. For example, examining DNA methylation and gene expression in RCTs with maltreated infants and children might further elucidate findings on the genetic moderation of intervention. Genes must express in order to have an effect on behavior. In the Cicchetti et al. (2011) RCT, hypermethylated genes may have precluded the expression of genes related to attachment. RCTs that measure DNA methylation and RNA gene expression at baseline and at post-intervention are critical to undertake in future work. Methylation is reversible and maltreated infants and children who de-methylate from their baseline methylation of genes as a function of intervention may be more likely to evidence secure attachment than those who remain hypermethylated.

**Dopamine Receptor D4**—The dopaminergic system is associated with attention, motivation, and reward mechanisms (Robbins & Everitt, 1996). The encoding gene for the dopamine D4 receptors (*DRD4*) contains a polymorphism which results in a number of different functional variants of *DRD4* (Van Tol et al., 1992). Much attention has been paid to the 7-repeat allelic variant because it is associated with reduced efficiency of the D4 receptor (Asghari et al., 1995). Additionally, the 5' region of *DRD4* has been found to be highly polymorphic (Mitsuyasu, Ozawa, Takeda, & Fukumaki, 1999). In particular, the -521C/T single nucleotide polymorphism (SNP) is associated with reduced transcriptional efficiency (Okuyama et al., 2000).

The *DRD4* 7-repeat allele has been associated with disorganized attachment in infants in some, but not all studies (Bakermans-Kranenburg & Van IJzendoorn, 2004; Bakermans-Kranenburg and van IJzendoorn, 2007; Gervai et al., 2005; Lakatos et al., 2002; Lakatos et al., 2000). In an examination of G X E interactions, Van IJzendoorn and Bakermans-Kranenburg (2006) found that maternal unresolved loss or trauma predicted infant disorganized attachment if the infant had the *DRD4* 7-repeat allele. *DRD4* did not moderate this link for infants who possessed the shorter allelic variants. A subsequent investigation by Bakermans-Kranenburg and Van IJzendoorn (2011) examined the effects of attachment security and *DRD4* on prosocial behavior in 7-year-olds. Prosocial behavior was measured by willingness to donate money to a charity after watching a promotional video clip. Findings revealed that attachment security was related to donating behavior, but only for children with the 7-repeat allele. Securely attached children with the *DRD4* 7-repeat allele donated significantly more money than their insecurely attached counterparts. An independent group of researchers conducted a study with a more ethnically diverse sample that examined the relationship between *DRD4* and caregiving style to disorganized attachment (Gervai et al., 2007). In contrast to the previous two studies, they found an association between disrupted maternal affect and disorganized attachment for infants who carried the short form of the *DRD4* gene, but *not* for those with the 7-repeat variant. Results to date are therefore mixed and require further investigation to elucidate the role of this *DRD4* allelic variant. Factors such as age, socioeconomic status, and racial/ethnic diversity that result in genetic heterogeneity and population stratification may potentially factor into *DRD4* functioning and should be considered carefully in future designs.

*DRD4* polymorphisms also have been implicated in resilience research. Cicchetti and Rogosch (2012) investigated the effects of child maltreatment and the *DRD4-521C/T* SNP on resilient functioning. Analyses revealed that nonmaltreated children with the TT genotype were significantly more likely to exhibit higher resilient functioning than were maltreated children with the same genotype, suggesting a greater sensitivity to the environment among children with this genotype. From a differential susceptibility perspective, these findings could be extrapolated to the therapeutic setting, where maltreated children with the TT genotype may be more predisposed to benefit from relationally-based interventions than those without this genotype.

Several studies have examined the interaction of *DRD4* and environmental stress in relation to intervention efficacy. Bakermans-Kranenburg and colleagues examined the moderating role of the dopamine receptor D4 (*DRD4*) variable number-tandem repeat exon III polymorphism on the efficacy of a relational intervention for children aged 1 to 3 with elevated levels of externalizing symptoms (Bakermans-Kranenburg, van IJzendoorn, Pijlman, Mesman, & Juffer, 2008a; Bakermans-Kranenburg, Van IJzendoorn, Mesman, Alink & Juffer, 2008b). Children and their families in the intervention condition received six 1.5-hour sessions of Video-Feedback Intervention to Promote Positive Parenting and Sensitive Discipline. Children in the intervention condition with the 7-repeat *DRD4* allele were found to have reduced externalizing behaviors (Bakermans-Kranenburg et al., 2008b) and decreased daily cortisol production (Bakermans-Kranenburg et al., 2008a). The intervention did not significantly reduce externalizing symptoms or decrease daily cortisol

levels for children without the 7-repeat DRD4 allele (Bakermans-Kranenburg et al., 2008a; Bakermans-Kranenburg et al., 2008b). These findings highlight the importance of examining potential biological markers of differential susceptibility in intervention research, which, in addition to identifying children who are most likely to benefit from a specified intervention, may prevent erroneous conclusions about a treatment's efficacy from being drawn.

Cicchetti, Rogosch, and Toth (2011) investigated the effects of child maltreatment and *DRD4* polymorphisms on infant attachment and intervention efficacy. Of the maltreated children who received either CPP or PPI (described above), those who possessed the 7-repeat allele were *less* likely than maltreated children with other DRD4 polymorphisms to display disorganized attachment at age 12 months or stability of attachment disorganization following intervention at age 2. Thus, attachment disorganization in maltreated children was more likely to occur in the absence of the *DRD4* 7-repeat allele. These findings suggest a possible role of early maltreatment in predisposing biologically sensitive children with the 7-repeat allele to become more responsive to adversity than to nurturing environments. Moreover, these results raise the question of whether children with the same genotype who are raised in exclusively supportive environments would later be less sensitive to the effects of adversity.

### HPA Axis Dysregulation

The hypothalamic-pituitary-adrenal (HPA) axis is one of the primary pathways involved in the mammalian stress response system. Following a stressor, the hypothalamus produces increased levels of corticotropin releasing hormone (CRH) and arginine vasopressin (AVP), which get released into the anterior pituitary gland. The pituitary responds by releasing adrenocorticotropic hormone (ACTH), which stimulates the adrenal gland to produce cortisol, a steroid hormone, or glucocorticoid. Levels of cortisol can influence developing neural circuits by affecting neurotropic factors and regulating gene transcription, altering the way in which the brain perceives and responds to threat (Tarullo & Gunnar, 2006). Cortisol production typically follows a diurnal circadian rhythm, with levels being high after waking in the morning and declining throughout the day (Kirschbaum & Hellhammer, 1989). When cortisol production becomes dysregulated, it can have a number of negative effects on health (Sapolsky, Romero, & Munck, 2000). For infants and children, the developing HPA system is particularly vulnerable to chronic stress, especially child maltreatment (see Gunnar & Quevedo, 2007).

Parental caregiving has been shown to moderate the regulation of the HPA axis in infants and children. For example, sensitive and responsive caregiving seems to protect the HPA axis, whereas the HPA axis of youth who receive insensitive or abusive caregiving is not buffered against the harmful effects of stress (Hart, Gunnar, & Cicchetti, 1995; Kaplan, Evans, & Monk, 2008; Sturge-Apple, Davies, Cicchetti, & Manning, 2012; Tarullo & Gunnar, 2006; Tu et al., 2007). Findings with regard to cortisol levels in maltreated children or in children with specific maltreatment subtypes have been inconsistent. Some investigations indicate elevations in basal cortisol or rising levels from morning to afternoon (Bugental, Martorell, & Barraza, 2003; Carrion et al., 2002; Cicchetti & Rogosch, 2001; De Bellis et al., 1999), while others show blunting of diurnal cortisol rhythms (Cicchetti,

Rogosch, Gunnar, & Toth, 2010; Dozier et al., 2006; Gunnar & Vazquez, 2001). Although the cortisol patterns reported in studies have varied, perhaps as a function of methodology utilized or sample characteristics, the literature has consistently reported dysregulated HPA axis functioning in maltreated children.

Several studies have evaluated the efficacy of interventions at regulating cortisol levels in youth. Fisher and colleagues (2007) randomized preschoolers in foster care to receive one of two interventions: Multidimensional Treatment Foster Care for Preschoolers (MTFC-P) or routine services provided with regular foster care (RFC). MTFC-P is a family-based therapy designed to address the developmental and social-emotional needs of preschoolers in foster care. For comparison, a third group of nonmaltreated preschoolers was recruited from the community. Findings showed that children in care who received MTFC-P exhibited cortisol activity comparable to the nonmaltreated group following the intervention. In contrast, children in the RFC condition showed increasingly flattened cortisol rhythms over the course of the study.

Dozier et al. (2008) evaluated the effects of an attachment-based relational intervention, ABC, on HPA functioning of infants and toddlers in foster care. ABC was compared to a second intervention, Developmental Education for Families (DEF), which was aimed at enhancing children's cognitive and linguistic development. A third group of children who had never been in foster care served as a community comparison group. Findings demonstrated that following intervention, children in the ABC group and those in the non-foster comparison group both exhibited significantly lower basal cortisol levels than children who received the control intervention.

Finally, Cicchetti, Rogosch, Toth, & Sturge-Apple (2011) examined the effects of child maltreatment on cortisol regulation in infants in the context of a randomized preventive intervention trial. Infants and their mothers were assigned to one of three intervention conditions: CPP, PPI, or CS. A fourth comparison group was comprised of nonmaltreated infants and their mothers. Results revealed that while none of the four groups exhibited differences in morning cortisol levels at baseline, trajectories of cortisol regulation began to diverge across time. At both post-intervention and at the one-year follow-up, maltreated children who received CPP or PPI remained indistinguishable from the nonmaltreated comparison group. However, maltreated children in the CS group became progressively more dysregulated, displaying lower levels of morning cortisol that were significantly different from the other groups. Across studies, findings indicate that with early intervention it is possible to normalize the development of cortisol regulation in children reared in adverse environments.

## Neuroimaging

**Structural Imaging**—Maltreatment early in life also has been shown to correlate with structural differences in many areas of the brain. Researchers have utilized magnetic resonance imaging (MRI), tensor based morphometry (TBM), and voxel-based morphometry (VBM) to better understand brain structures associated with abuse. Abnormalities as indicated by increases or reductions in gray matter or global volume have been found in areas such as the prefrontal cortex, hippocampus, amygdala, corpus callosum,

anterior cingulate cortex, and cerebellum of maltreated children and/or adults with histories of maltreatment (for reviews see Hart & Rubia, 2012; McCrory, De Brito, & Viding, 2012). The caveat associated with many of these studies is that the majority of individuals with abuse histories carry one or more psychiatric diagnoses, making it difficult to disentangle the effects of maltreatment from those associated with diverse types of psychopathology.

**Functional Imaging**—In contrast to the evidence available from investigations using structural neuroimaging, fewer studies have examined the functional correlates associated with maltreatment. Techniques such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) are used to locate areas of the brain that become active while individuals perform a specific task. Only a small number of these studies have been conducted with maltreated children. To date, investigations of adults or children with abuse histories have revealed atypical cortical activation patterns during tasks involving working memory, inhibitory control, emotion processing, reward processing, and sensory processing, among others (for a review see Hart & Rubia, 2012; McCrory et al., 2012). Many of the cortical areas affected during these tasks correspond to the volumetric differences seen via structural MRI. As with the structural neuroimaging studies, it also is important to control for psychiatric diagnoses as a potential confound in these functional imaging investigations. We do not know of any studies that have investigated whether relational interventions can normalize brain structure and function. To address this issue, RCT relational interventions should be conducted that include baseline, post-intervention, and follow-up neuroimaging assessments of brain structure and function.

### **Cognitive and Emotional Deficits and Attention Biases**

Given the evidence with respect to structural and functional brain differences observed in maltreated children, it is not surprising that a number of cognitive and emotional sequelae have been discovered as well. In particular, maltreated youth exhibit impairments in IQ, memory, attention, inhibition, and emotion processing (Hart & Rubia, 2012). Deficits in some of these areas have implications for the ways in which maltreated children interpret and respond to interpersonal interactions. Relational interventions with maltreated children should be useful in addressing these cognitive and attentional biases. For example, numerous studies have indicated that maltreated children exhibit difficulties correctly identifying and discriminating facial expressions of emotion (Fries & Pollak, 2004; Pears & Fisher, 2005; Pollak, Cicchetti, Hornung, & Reed, 2000; Pollak & Sinha, 2002). Furthermore, children with abuse histories appear to have attentional biases for negative facial expressions, such as anger (Pine et al., 2005; Pollak, Klorman, Thatcher, & Cicchetti, 2001; Pollak & Sinha, 2002; Romens & Pollak, 2012). While a heightened sensitivity to threat may be advantageous to children in the context of an adverse environment, it can also become problematic in other situations. For instance, physically abused children are less accurate in encoding social cues, and are consequently more likely to respond aggressively to problematic social situations (Cicchetti & Valentino, 2006).

## RECOMMENDATIONS

Although great strides have been made toward establishing evidence-based relationally-informed treatments for childhood maltreatment over the last several decades, the field has by no means reached its zenith. Therefore, we reflect on contributions of developmental psychopathology with relevance to intervention that have been highlighted throughout the emergence and ascendance of the field and that have been articulated in articles published in *Development and Psychopathology* over its 25 year history. Based on this synopsis, we provide recommendations that we believe will continue the momentum that has been generated to date with respect to providing and evaluating relationally-based interventions for individuals exposed to childhood maltreatment.

From its inception, developmental psychopathologists have sought to discover the most effective means of preventing and ameliorating maladaptive and pathological outcomes (Cicchetti, 1990; Sroufe & Rutter, 1984). An early stated goal of developmental psychopathology has been to help reduce the schism between empirical research and its application to the treatment of individuals struggling with adversity and mental disorders (Cicchetti, 1990; Toth & Cicchetti, 1999; Toth & Manly, 2011). In fact, in reflecting on the past achievements and future promises of developmental psychopathology, Cicchetti and Toth state that “one of developmental psychopathology’s potential contributions lies in the heuristic power it holds for translating facts into knowledge, understanding, and practical application” (2009, p. 17). In addition to providing an impetus for translational research (Cicchetti & Toth, 2006), evaluations of randomized clinical prevention and intervention trials can provide essential insights into affirming, challenging, and augmenting existing developmental theories (Cicchetti & Hinshaw, 2002; Cicchetti & Toth, 2009; Howe, Reiss, & Yuh, 2002). For example, research to date on differential susceptibility to the environment suggests that the randomization of maltreated children with varied levels of susceptibility into various arms of an RCT could provide unprecedented insights on “what works for whom and why” (Roth & Fonagy, 2005, p. 1) with respect to relationally-informed interventions (Cassidy et al., 2011).

With advances in neuroimaging and molecular biology, we are increasingly able to ascertain how anomalies in brain structure and function may contribute to, or be a consequence of, the emergence of psychopathology (Cicchetti & Toth, 2009). Importantly, with increasing utilization of a multiple-levels-of-analysis approach to evaluating relationally-based interventions advocated by developmental psychopathologists (Cicchetti & Dawson, 2002), we also will be able to determine if psychosocial interventions can positively affect the brain, perhaps thereby increasing the likelihood of promoting sustained adaptive functioning. In order to maintain the progress that has been made to date, to increase the momentum of advances in understanding the mechanisms through which relationally-based interventions are effective, and to identify the characteristics of individuals that may make them more or less likely to benefit from a given intervention, we proffer the following recommendations.

- Although some progress has occurred, it is imperative that we continue to examine mediators that contribute to treatment efficacy. Understanding how or why a



treatment works allows for adaptations that may maximize the most potent therapeutic agents, potentially improving treatment efficacy (Kazdin & Nock, 2003). With many insurance companies placing limitations on the number of sessions an individual or family may receive, it is increasingly important to identify causal pathways that lead to change so that the necessary components of treatments can be identified, allowing for optimal treatment efficiency.

- Additionally, it is important for programs of research within prevention science to examine potential moderators of treatment efficacy, particularly those associated with maltreatment subtype. This will allow the field to continue to ascertain which treatments work best for physical abuse, emotional abuse, sexual abuse, and neglect so that we are better able to improve an individual child's developmental trajectory. Because most typically multiple subtypes of maltreatment co-occur, it will be important that investigators consider the presence of multiple subtypes of maltreatment when attempting to identify moderators of outcome. In addition, other maltreatment parameters, including age of onset, severity, chronicity, and relationship to perpetrator also can serve as moderators of treatment efficacy.
- Related to the above point, emerging research on differential sensitivity to the environment highlights the importance of considering how individual characteristics may interact with a treatment modality to result in better or worse outcomes. Conducting treatment evaluations where measurement batteries include the examination of relevant individual characteristics that can later be factored into analytic plans emerges as a valuable opportunity to better understand why treatment is effective. Such research could be facilitated by cross-disciplinary collaborations between scientists who focus on neurobiological functioning and intervention scientists. Although meta-analyses have revealed modest intervention effects for relationally-based interventions (Bakermans-Kranenburg et al., 2003), it is possible that treatments that have not proven to be effective actually are effective for a subset of the sample. Analyses designed to detect such effects should be routinely incorporated into our outcome studies.
- Additionally, more interventions designed to address the sequelae of child maltreatment across the life course are necessary. As discussed earlier, the majority of current relational interventions for child maltreatment have been developed for young children as a way to intervene when the risk for maltreatment is at its highest and presumably the relationship between parent and child is most malleable. PCIT is notable for its applicability to school aged children. IPT-A and IPT stand out as relational treatments that can address the effects of maltreatment during adolescence and adulthood, respectively, though more work is needed for the adaptation of IPT-A for use with adolescents with child maltreatment histories. Using the lens of developmental psychopathology (Cicchetti, 1993; Rutter & Sroufe, 2000), the impact of maltreatment may manifest in different ways across the life course, necessitating interventions to address the effects of maltreatment during later developmental periods or the effects of maltreatment that occurs after early childhood. Treatments such as Trauma-Focused Cognitive Behavioral Therapy (Cohen, Mannarino, & Deblinger, 2006) and Alternatives for Families

Cognitive Behavioral Therapy (Kolko & Swenson, 2002), have been developed to effectively treat trauma, including maltreatment, in school-aged children and adolescents. Although these treatments often include parents or caregivers in all or portions of treatment, the focus of the driving theory and practices of these interventions are at the cognitive-behavioral level and not the relational level. Given the relational nature of abuse and neglect and the continued impact of maltreatment on the development of relationships across the life course (see Cicchetti & Valentino, 2006), the development and evaluation of relational interventions for older maltreated children and adolescents emerges as an important area for future research.

- Additional research on the length of treatment also is necessary. Although meta-analytic findings suggest that shorter interventions (fewer than 16 sessions) are more effective (Bakermans-Kranenburg et al., 2003), long term relationally-based interventions also have been found to be efficacious with very high-risk populations, including those with maltreating families and children exposed to domestic violence, as well as with families that include a mother with a major depressive disorder (Lieberman, Van Horn, & Ippen, 2005; Cicchetti et al., 2006; Stronach et al., 2013; Toth, Rogosch, Manly, & Cicchetti, 2006). Thus, we caution that it is premature to conclude that “less is more” (Bakermans-Kranenburg et al., 2003). Ideally, individuals with similar levels of maladaptation should be randomly assigned to a short versus a longer term relationally-informed intervention and evaluated over time. Given the finding that sustained security of attachment was found only in individuals receiving an attachment-theory informed intervention (although the parenting model examined was not short term) (Stronach et al., 2013), we believe that issues related to the ideal length of treatment are quite complex and require further research.
- Additionally, future research needs to be directed toward ascertaining if certain types of intervention are more effective than others when individuals have histories of child maltreatment. Specifically, future work needs to directly compare IPT, CBT, and medication. Although IPT has been found to be effective for treating depression in individuals with histories of trauma, more recent research directly comparing IPT, CBT, and medication has found that IPT was less effective when adults had histories of child maltreatment. Findings such as these suggest that it may be important to provide a relational form of psychotherapy more proximal to the occurrence of the maltreatment in order to prevent future depressive episodes. Because relapse in depressed individuals was found to be higher even in individuals who responded positively to CBT or medication, future work needs to be directed toward identifying which interventions are more effective in preventing a future depressive episode.
- An area of paramount importance to moving the field forward involves elucidating underlying biological processes that are influenced by child maltreatment and how these may be impacted by intervention or moderate treatment effects. Given the presence of diverse forms of psychopathology in individuals with histories of child maltreatment, future research will need to disentangle the effects of maltreatment

versus psychiatric comorbidity when evaluating structural and functional brain anomalies. Although considerably more basic research on neuroimaging in maltreated populations, particularly children and adolescents, is needed, the incorporation of neuroimaging assessments into RCTs could provide information on the potential malleability of the brain in response to psychosocial interventions.

- Determining the multiple levels at which change is engendered through RCTs will provide insight into the mechanisms of change, the extent to which neural plasticity may be promoted, and the interrelations between biological and psychological processes in the development of maladaptation, psychopathology, and resilience in maltreated children. It is thus possible to conceptualize efficacious resilience-promoting interventions as examples of experience-dependent neural plasticity. If assessments of biological systems are routinely incorporated into the measurement batteries employed in resilience-facilitating interventions, then we will be in a position to discover whether the nervous system has been modified by experience.
- Despite rapid promising advances, our understanding of genetic moderation of intervention outcome, particularly for maltreated children, remains in its infancy. Most interventions have strived to change the environment with no consideration for genetic involvement. Thus, interventions with *G AND E* are in a nascent state.
- Research on GxE and on epigenetics needs to incorporate, and indeed emphasize, a developmental perspective. Genes may affect how environmental experience affects the developmental process and this may operate differently at various developmental periods. Moreover, the effects of genes and experience at a particular period may be influenced by the effects of prior development. Environments may affect the timing of genetic effects and gene expression. Additionally, there are experience effects on the epigenome and these also would operate differently across the course of development.
- There are a number of ways that there can be genetic effects on intervention efficacy. Are some individuals, based on genetic variation, more susceptible to the positive effects of intervention? Are different interventions more effective with different individuals based on genetic differences (i.e. matching intervention to genotype group)? Does intervention affect DNA methylation resulting in changes in gene expression? DNA methylation changes in response to experience could lead to the design of both prevention and intervention strategies that change the expression of genes to promote healthy physical and mental health outcomes. Given that the demethylated epigenome would be transmitted to the next generation, it will be important to determine if decreased child maltreatment risk through efficacious intervention alters the epigenome, which in turn results in a “less risky” epigenome being transmitted to the next generation.
- Finally, we must increase the rate at which relational interventions that have been found to be efficacious through the conduct of RCTs are disseminated to community contexts and evaluated for their effectiveness in settings that routinely treat significant numbers of individuals with histories of maltreatment (Toth & Manly, 2011). Delays in the exportation of evidence-based relational interventions

into community settings are inexcusable as large numbers of children and adults most in need of such services are unable to access them.

## SUMMARY AND CONCLUSIONS

In this article, we have reflected on the past, present, and future challenges encountered and the opportunities present when providing and evaluating relationally-based interventions for individuals with histories of child maltreatment. We have drawn upon the extant research, including more recent investigations in neurobiology and in molecular genetics, to examine where we have been and to suggest new frontiers that remain to be explored. Principles derived from developmental psychopathology have been integral to facilitating progress in this arena, and we believe that theoretical perspectives in developmental psychopathology will continue to play a significant role in informing future advances in the conduct of relational intervention trials and in the dissemination of such evidence-based treatments for individuals with histories of child maltreatment. It is our hope that the dissemination of efficacious interventions that are informed by sound theory and research will enable researchers and clinicians to provide maltreated children with an agenda of hope that can minimize or eradicate the deleterious effects of their adverse developmental histories.

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