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Emotional availability (EA): Theoretical background, empirical research using the EA Scales, and clinical applications

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ABSTRACT

Emotional availability (EA), as a construct, refers to the capacity of a dyad to share an emotionally healthy relationship. The Emotional Availability (EA) Scales assess this construct using a multi-dimensional framework, with scales measuring the affect and behavior of both the child and adult partner (caregiver). The four caregiver components are sensitivity, structuring, non-intrusiveness, and non-hostility. The two child components are the child's responsiveness to the caregiver and the child's involvement of the caregiver. We first describe this relationship construct, look at psychometric properties in basic and prevention/intervention efforts, then review the extant empirical literature in order to examine the scope of studies assessing EA by using the EA Scales. We also explore its use in clinical practice. Throughout, we critically evaluate the knowledge base in this area as well as identify areas for further growth.

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Introduction

The intent of this paper is to outline the theoretical background and use of the Emotional Availability (EA) Scales, a tool that can be used to "take the temperature" of relationships between children and their caregivers. There is a large body of empirical research using the EA Scales, a relationship-based assessment that can be used to examine caregiver–child relationships across a broad spectrum of adult–child relationships (e.g., parent–child, child care provider/teacher–child), developmental ages (e.g., infancy, preschool, middle childhood, and adolescence), and contexts (e.g., naturalistic, semi-structured and structured play, teaching, feeding, bathing, separation–reunion). Our goal in this paper is to (a) provide an overview of the theoretical background of the EA Scales; (b) examine the psychometric evidence in basic science, prevention/intervention studies, and cross-cultural applications; (c) summarize the large body of empirical research using these scales; (d) understand the clinical practice that employs the EA Scales; and (e) critically evaluate this work and interpret the findings emanating from it.

Theoretical background

Mahler, Pine, and Bergman (1975) first used the term "emotional availability" to describe a mother's supportive attitude and presence in the context of infant/toddler explorations away from her. They noted that healthy mother–child relationships allow for exploration and autonomy, at the same time recognizing the importance of physical contact and emotional "refueling." Other writings (e.g., Sorce & Emde, 1981) emphasized the importance of emotional availability including not merely physical presence, but also emotional signaling and awareness of such signaling from others. For Emde (1980, 1983, 2000), emotional availability in a parent–child relationship refers to the adult's "receptive presence" to the child's emotional signals. Emde and Easterbrooks (1985) stated that emotional availability is an affective barometer of the relationship between a parent and a child and emphasized affective attunement to a broad spectrum of negative *as well as* positive emotions.

Emde wrote:

> "Emotional availability refers to an individual's emotional responsiveness and 'attunement' to another's needs and goals; key is the acceptance of a wide range of emotions rather than responsiveness solely to distress (Emde, 1980, p. 80)."

In other words, emotional availability involves a full range of emotions, both negative (e.g., distress, anger, sadness, disgust) and positive (e.g., interest, satisfaction, joy, and surprise). The child's emotional expressions provide the parent with information about what the child is feeling and what he/she may or may not need or want:

> "Crying, for example, gives a message of 'come change something', a message that is species-wide and peremptory, while smiling gives a species-wide message something like 'keep it up, I like it' (Emde, 1980, p. 97)."

Thus, a caregiver's emotional availability toward both positive and negative emotional feedback and initiatives from the child is central to the child's thriving, and the child provides feedback to the caregiver about how the adult's behavior is received. Often, the literature concerning parent–child relationships does not emphasize the fact that a child's emotional expressions are part of a feedback system that both assures parents of their competence and is rewarding. That is, not only is the parent's emotional availability important for the child, it is important for the child to be emotionally available to the parent – to let the parent know how he or she has been feeling, to give the parent feedback, to communicate that the parent is being needed and appreciated, and to demonstrate that time with the parent is enjoyed. In good-enough circumstances, the child's emotional availability to the parent enables a mutual exchange which is varied, interesting, dynamic, and satisfying. Such mutuality of emotional exchange confirms that the parent's love and care has been received by the child.

Attachment theory (Ainsworth, Blehar, Waters, & Wall, 1978) is an important foundation for the concept of emotional availability. The idea of sensitivity to the infant's emitted cues and

communications, namely the importance of clear and undistorted parental perceptions and prompt and accurate responsiveness to the infant's cues and communications, is a hallmark concept developed in the context of attachment theory and research (Ainsworth et al., 1978; Bowlby, 1969, 1973). As highlighted by Bretherton (2000), an emotional availability framework (as operationalized in the EA Scales) expands this concept to include "emotional" and "dyadic" features, which we will explain in the pages below. Beyond embracing the specific concept of sensitivity, the emotional availability construct provides a multidimensional set of features (e.g., caregiver sensitivity, non-hostility, structuring, non-intrusiveness; child responsiveness and involvement) that add to our understanding of attachment relationships. In part, the EA Scales broaden the assessment of the attachment framework by providing a window into the child's contribution to the relational interaction. By doing so, we acknowledge that the child's side of the relationship may be different than the parental side (e.g., under circumstances where parent and child do not regularly see each other, where the parent and child do not share a relationship history, where the child may be suffering from a medical condition, etc.).

In addition, the EA Scales are a way for researchers, clinicians, or others to reliably summarize the overall affective quality of the parent–child or caregiver–child relationship, beyond the child's attachment with a caregiver. Furthermore, the EA framework allows assessment of relational qualities during the "preattachment" and "attachment-in-the making" phases (the early months of life prior to the consolidation of specific attachment relationships) (Bowlby, 1969, 1973).

In the emotional availability framework, the "emotional" features of a relationship are separated into several dimensions of adult–child interactions, with caregiver sensitivity (a hallmark of the attachment framework) being one of several important qualities that are assessed. These separate dimensions may be used to capture uniquely attachment-relevant aspects of the relationship (focusing on separation–reunion or other distress- or stress-evoking experiences), as well as characteristics of the relationship that extend beyond attachment (for example, specific contexts of discipline, frustration, teaching, fantasy play, bathing, or all of these, as can be seen under naturalistic conditions). Regardless of the age of the child or the context of observation, the emotional feedback loop between parent and child is the hallmark of the system.

In addition to attachment theory, which certainly influenced the genesis of the Emotional Availability Scales, there are several other important theoretical influences. For example, psychodynamic theory, emotions theory, systems theory, and the transactional perspective informed the construct emotional availability and the EA Scales. For example, Mahler's (Mahler et al., 1975) idea of a trusted figure being available in the background ("being there") for the infant, without necessarily responding in some way, is an aspect of the concept of emotional availability. Similarly, Emde's (1980) view that emotions act as a barometer of relationships was an important move forward in developing the concept of emotional availability as distinct from mere behavioral responsiveness. Finally, the systems view (Guttman, 1991) of understanding relationships in a holistic manner, with each individual contributing, and also being affected and changed by the partner's influence, is an important facet of emotional availability. The transactional model (Sameroff, 2009, 2010), with the child and parent mutually influencing one another also figures into this perspective. Indeed, emotional availability stems from a dynamic perspective that emphasizes the importance of individuals in relationships in the family system, with an evaluation of the family system occurring at dyadic levels, such as the mother–child relationship or the father–child relationship. As such, the mother, father, and child are not observed and evaluated as individuals, but as individuals in differing dyadic relationships, with the understanding that each person is affected by, and influences, one's relationship partner. While Ainsworth's operationalization of sensitivity (e.g., Ainsworth et al., 1978) focuses on the adult, the EA view, and the EA Scales adopt a dyadic or relational stance, and provide a perspective on both child and caregiver, with the explicit understanding that the view of the parent may not be the view of the child.

Each of the above perspectives contributes to the concept of emotional availability, which forms the foundation of the observation scales described by Biringen and colleagues (Biringen, 2008; Biringen, Robinson, & Emde, 1998). In the section below we provide an overview of the assessment procedure and operationalization of the EA construct in the EA Scales. Before doing so we briefly note that these scales are quite flexible in application across variations in child age (e.g., infancy into early adolescence), characteristics of the adult (e.g., mother, father, child care provider), and setting or

context of observation (e.g., home, child care center; freeplay, structured teaching). We will return to these issues later in this paper, when we present the empirical research using the scales.

Descriptions of and procedures for using the Emotional Availability (EA) Scales

Emotional availability is a dyadic or relationship construct: although the caregiver dimensions are distinguished from the child dimensions, the emotional availability (EA) of both partners is viewed from within the context of this particular relationship. This means that the score for one of them can only be meaningfully assessed when the other's complementary qualities (as they relate to one another) are taken into account. Thus, the system is a relationship evaluation system, rather than a system for scoring the parent and child as individuals in interaction. Relationships are evaluated by examining how one member of the dyad *affects* the other, and emotionally affects the other, rather than merely coding how one (or the other) person *behaves*. Although dyadic ways of looking at interaction have become popular in molecular coding systems (e.g., Beebe et al., 2000), to our knowledge, the EA Scales are the only global system that provides a dyadic/relational perspective on caregivers and children.

There are two versions of the coding system, one operationalized for young children (Infancy/Early Childhood Version) and the other for school-age children and youth (Middle Childhood/Youth Version). The scales have been validated for children between the ages of 0 and 14 years of age (Biringen et al., 2010; Easterbrooks & Biringen, 2009), providing continuity of measurement across a broad developmental spectrum. Although the most recent edition (4th edition) (Biringen, 2008) is at least 100 pages for each of the age-related versions (as compared to one half this length for the 3rd edition), nonetheless the 4th edition is an enhancement of earlier versions and not a decidedly different course for the system. Below, we briefly describe each of the dimensions of emotional availability: adult sensitivity, structuring; non-intrusiveness, non-hostility, and child responsiveness and involvement of the adult.

Adult sensitivity

The attachment view of sensitivity has been expanded by recasting sensitivity as a dyadic and "emotional" construct. Thus, most of the time, a parent cannot look highly sensitive without the child also looking highly responsive and appropriately involving (that is, the caregiver is unlikely to receive a score of highly sensitive when the child seems avoidant or clingy/passive). However, it is possible for a caregiver to look insensitive and a child to seem distant or clingy. It is also possible for a caregiver to look "apparently sensitive" (mid-range sensitivity), and the child to seem detached/avoidant.

An *optimally* sensitive parent tends to create a generally positive, genuine, and authentic affective climate. At the high end, verbal and non-verbal emotional expressions are congruent. Caregiver incongruence between channels of communication (e.g., smiling but with a cool tone of voice; saying positive things but with a flat affect; positive facial affect that is belied by an impatient tone of voice) or displays of warmth that are not combined with sensitivity to the child's cues, reflect the mid-range of the sensitivity spectrum that is referred to as inconsistent sensitivity or "apparent sensitivity". The latter term is particularly apt because many professionals actually view such interactions as quite positive during training, suggesting that such incongruencies can be subtle. Overall, EA sensitivity focuses on dyadic expressions of emotions and, in this sense, is a measure of emotional sensitivity (e.g., parent having a calm emotional presence and reading a child's emotional cues appropriately), rather than only behavioral sensitivity (e.g., parent saying nice things or responding quickly to get the bottle for a hungry baby, but with a flat expression).

Sensitivity furthermore refers to a *clear perception* of, and *appropriate parental responsiveness* to, the child's emotional expressions. In addition, the scale focuses on qualities such as: *attunement to timing and rhythm*, *flexibility*, *variation and creativity* of the play between caregiver and child, as well as *parental acceptance* of the child.

While many of the these components as well as the overall observation of adult sensitivity may at first appear obvious to a seasoned developmentalist or clinician, the actual experience of training thousands of professionals suggests that there is a tendency to view this construct as dichotomous 'positive' or 'negative' parenting, rather than as an attachment-based quality that takes into account

the full spectrum of characteristics that might map onto the traditional attachment categories (secure, insecure/avoidance, insecure/resistance, and disorganized attachment).

Adult structuring

Adult structuring is a matter of the extent to which the adult adequately guides, scaffolds, and serves as a mentor to the child's activities. One observes the parent making an effort to follow the child's lead and setting appropriate limits, whereby adaptive behavior is stimulated and maladaptive behavior is discouraged, all the while imbuing the child with a sense of autonomy. This can be seen when the parent lays down rules and demands for respect, but with an eye toward giving a child a sense of internal standards and rules for autonomous pursuits and decisions. Because EA is a dyadic construct which describes the sending and receiving of emotional signals, there can only be adequate structuring when the parent's interventions are successful, and not merely repeated, automatic attempts to which the child cannot or does not attend. *Optimal* structuring refers to consistent—but not excessive—indications and suggestions, but also to more implicit frames of reference and rules for the relationship. Adult structuring provides a framework by an "older and wiser" (Bowlby, 1969/1980) parent to a child, rather than a peer to another peer.

Adult non-intrusiveness

All EA dimensions are framed in the positive or the absence of a negative quality so that the high end is always optimal. Thus, *non-intrusiveness* refers to qualities such as the lack of *over-direction*, *over-stimulation*, *interference,* or *over-protection*. Treating a child as if it s/he were younger than is the case is one sign of intrusiveness since it undermines the child's autonomy. The more a caregiver denies a child's autonomy, the more intrusive he or she is. When the child shows signs that the parent's overstimulating behavior (or micromanagement, however benign in intent) is undermining of autonomy and unwelcome, it is intrusive when the parent continues. Naturally, this dimension is dependent on the child's level of development, and is dependent on feedback from the child. For instance, if the parent does not give a typically-developing toddler the chance to begin to eat his or her own food, this could be regarded as intrusive behavior. The same parental behavior, however, would not be viewed as intrusive when the child is younger, or if the child has a disability that would limit self-feeding. As with other EA dimensions, EA non-intrusiveness is, to some extent, dyadic, and, thus, a parent's behavior is viewed as overwhelming mostly if the child indicates that it is so (e.g., if a child appears to welcome the rough and tumble play with dad, dad would not be intrusive by continuing the stimulating play).

Non-intrusiveness and structuring are often confused with one another. Structuring is about the guidance, mentoring, and empowerment (of autonomous pursuits), while non-intrusiveness is about actual interference with ongoing behaviors. Theoretically, it is possible for some parents to be unstructuring (or neglectful) and still intrusive, even physically intrusive. It is also possible for an occasionally physically intrusive parent to be appropriately structuring in many ways.

Adult non-hostility

Non-hostility ranges from the absence of hostile responses, to concealed/covert hostility, to openly hostile responses. The most hostile parent is openly exhibiting his/her hostility to the child in words or deeds. The nature of the interaction is threatening or frightening. Forms of hidden or covert hostility are: slightly raising one's voice, showing subtle signs of anger, impatience, and boredom. It is important to bear in mind that the adult's hostility does not necessarily need to be directed to the child. One also has to take into account dissatisfaction, impatience, anger or other concealed or open forms of hostility that may be present in the background, given the importance of "background anger" (Cummings, 1987) for children's development. Thus, even if the dyadic interaction between the caregiver and target child is positive, any hostile interactions that the caregiver engages in with others in the background will affect the rating of non-hostility. However, any signs of hostility must be observable, rather than merely inferred. The *optimal* is non-hostility, where there are no signs of covert or overt hostility.

Child responsiveness to the adult

Responsiveness of the child to the parent focuses on the child's *emotional* and *social* responsiveness to the caregiver. This is reflected in two aspects of the child's behavior—affect and responsiveness. That is, in evaluating the child's responsiveness, the observer waits until the caregiver invites the child to interact, and then observes the child's response (does the child respond behaviorally to the initiator), and in particular, its affective quality (what is the emotional temperature of the response?). When the child ignores the invitation and responds with a rather weak emotional expression, it is not considered optimally responsive. Similarly, when the child looks at the parent and speaks to him or her in a feeble, unenthusiastic tone, s/he is considered not optimally responsive. There are various styles of non-optimal responsiveness. The child can be evasive or non-responsive to the parent; the child can be less obviously evasive by expressing affective negativity; finally, the child can also be excessively responsive, for instance in a dyad where the parent is less sensitive than normal and the child grasps at every offer to maintain contact. The *optimally* responsive child is both happy and emotionally receptive to the parent. Further, consistent with a relationships perspective, an observation of emotional availability involves a look at patterns of behavior over time. For example, the EA Scale for responsiveness considers whether the child is generally emotionally responsive to the adult; is responsive only under circumstances (e.g., when he or she needs to use the adult instrumentally to attain a goal); or is behaviorally responsive but not emotionally "present" in the interaction.

The child's responsiveness to the parent is potentially the rating scale that reflects the concept closest to the current attachment view of a secure/insecure child, and many of the EA concepts to describe this quality have been inspired by attachment theory and research. For example, qualities such as avoidance and clinginess are key concerns in the attachment coding system. The EA construct also includes the expression of a range of emotions (Emde, 1980) and emotion regulation (Martins, Soares, Martins, Terenod, & Osóriof, 2012) as important aspects of child responsiveness. For example, an emotionally dysregulated child is unlikely to be viewed as optimal in child responsiveness, even if compliant, obedient, and responsive, because the emotions will be at odds with the behavioral responsiveness (for example, the child might be "going through the motions" behaviorally, but without pleasure in the relationship). Also important is *over-responsiveness* (which includes role reversal and people-pleasing behaviors), which would be coded low as well, and, cell sizes permitting, analyzed separately.

Child involvement of the adult

Child involvement of the caregiver refers to the child's ability to involve the parent in his/her play and the activity in general, thus including the adult in the interaction. The observer looks at what initiatives the child makes in order to accomplish these behaviors. A child who is *optimally* involved with the parent makes him or her into an audience for his play. The child engages the parent in play as a fellow player or supporting figure. The child involves a parent by looking, asking questions, telling a story, or exhibiting something, with the potential that the parent might become involved in the child's activity. A child's evasiveness (and hence less optimal involvement) would be apparent from his/her gaze or body language, and from a lack of initiative and engagement. The key element for this scale is the balance between the child's ability to be autonomously active and his efforts to engage the parent's interest. In some cases, the child might involve a great deal, but in negative ways (such as negative attention seeking, distress, and the like) and in such cases, the child is considered lower, not higher in involving behaviors. This is an oft-missed point.

This quality is about the child's internalization of autonomous agency and initiative, and hence is about positively-involving behaviors toward the parent. Certainly, we expect that children will grow in initiative and agency as they grow older, regardless of the parent–child relationship quality, and in fact young infants may only have a few behaviors to show their initiative (looking, babbling). Importantly, this quality describes positive ways to involve the parent, rather than negatively involving behaviors (crying, distress, or crises in older children); as the negatively involving behaviors increase, the evaluation of child involvement decreases and would be referred to as *over-involvement*.

EA composites

If all EA scales are utilized, there are six codes (4 for adult, two for child). To decrease the number of variables, some studies have conducted factor analyses. For example, Garvin, Tarullo, van Ryzin, and Gunnar (2012) found that all six scales loaded on one factor. In contrast, in our early unpublished work, we found two factors (one an affective and another a control factor) (Biringen, Robinson, personal communication, 1995). In a recent special section on this topic, Oppenheim (2012) and Bornstein, Suwalsky, and Breakstone (2012) both suggested looking at patterns of the EA Scales rather than specific scales only. Easterbrooks, Chaudhuri, and Gestsdottir (2005) conducted cluster analysis to examine dyadic patterns of mother–child EA. This analysis yielded four distinct groups of emotional availability patterns, reflecting synchrony and asynchrony between maternal and child behavior: (1) low-functioning dyads, (2) average dyads, (3) average parenting/disengaged infants, and (4) high-functioning dyads.

In contrast to statistical approaches to summarizing, other researchers have summed the scores on each of the dimensions, yielding one EA composite (Wiefel et al., 2005). The newest approach to compositing is the Emotional Attachment and Emotional Availability (EA2) Clinical Screener (Biringen, 2008), which is a 100-point scale, and involves a summary of the caregiver's side of EA and a separate score for the child's side of EA. It has been validated in several independent samples, and results include the finding of higher adult–child EA2 Clinical Screener being linked with greater attachment security in a group of child care professionals and infants/toddlers (e.g., Baker & Biringen, 2012) and with the DC 0-3 PIRGAS (Espinet et al., in press). What is surprising is the lack of bridge to concepts such as authoritarian, authoritative, neglecting/rejecting, and permissive parenting (Baumrind, 1967), although all of the ingredients are inherent in the EA Scales, except that 'warmth' in the Baumrind system would be substituted by 'sensitivity' in this system, which we believe is an even more powerful component of parenting than warmth (Ainsworth & Marvin, 1995).

Psychometric properties of the Emotional Availability Scales

Reliability[1]

The operationalization of emotional availability in the EA Scales has demonstrated acceptable psychometric properties, including validity and reliability. For example, one study (reporting on two occasions of in-home observations one week apart, that is test–retest reliability) of 52 middle-income mothers and their 5 month-old infants, used average absolute agreement intra-class correlations (ICCs) in a two-way random effects model. ICCs yielded reliabilities that ranged between .79 for non-hostility and .92 for sensitivity (Bornstein, Gini, Suwalsky, Putnick, & Haynes, 2006). Further, Bornstein, Gini, Putnick, et al. (2006) and Bornstein, Gini, Leach, et al. (2006) also reported adequate ICCs for a separate sample of 34 mothers and their 2 year olds – in home versus lab contexts (both free play) one week apart. Reported ICCs for inter-rater reliability were in the range of .76–.96; due to restricted ranges for non-intrusiveness and non-hostility, ½ point differences between the coders on each scale yielded percent agreement of 93–100%. These two papers and others (Bornstein et al., 2010) suggest at least short-term stability, in the same setting and across contexts, as well as acceptable reliability. Other investigations report longer-term stability. For example, Biringen, Matheny, Bretherton, Renouf, and Sherman (2000) studied 40 mother–child dyads, at child age 18, 24, and 39 months (with kappas within 1 point at 100% for each of the scales); EA Scales were stable between 18 and 24 months in the home, but no relation was found by 39 month-lab visit. This lack of temporal association might be due to discontinuity in EA across time or a change of context of observation between home and lab. In contrast to short-term stability (Bornstein et al., 2010) and longer-term

[1] The system does require training. The training is offered both online and in vivo, and hence readily accessible. The training involves reading, lecture, and practice on approximately 10 training videos of parent–child relationships, followed by a test of inter-rater reliability, with the requirement of achieving greater than 80% agreement across all codes. The training is 3 days (whether in vivo or online) and then approximately 10 h of inter-lab reliability testing and feedback through the secure website (www.emotionalavailability.com via the EA Portal).

stability (Biringen, Brown, et al., 2000; Biringen, Matheny, et al., 2000) with respect to mother–child interactions, evidence from the realm of child care indicates that center-based providers' EA was more variable over the course of a year than that of family care providers (Susman-Stillman, Pleuss, & Englund, 2013), suggesting that quality ratings of child care may benefit from multiple measurements. In terms of the version for older children (EA Manual Middle Childhood/Youth Version), only Easterbrooks and colleagues (e.g., Easterbrooks, Bureau, & Lyons-Ruth, 2012) have published work on this older age period; they found acceptable inter-rater reliability. Detailed information on psychometrics of the EA system, including inter-rater reliability, test–retest reliability, construct validity (convergent/divergent), stability/continuity over time, cross-cultural validity, and some qualitative description may be found in Table 1. The EA Scales' use in prevention/intervention studies and, thus, sensitivity to change may be found in Table 2.

Construct validity, cross-cultural applicability, and other psychometric information

In addition to acceptable reliability estimates, many studies have supported the theoretically-expected relations between EA and child–mother attachment, as well as attachment to professional caregivers; others have addressed the links between EA and characteristics of caregivers (e.g., mental health) and children (e.g., children with disabilities). Ziv, Aviezer, Gini, Sagi, and Koren-Karie (2000) reported construct validity and cross-cultural applicability of the EA Scales (measured in 10 min free play for 687 mothers and their 12-month-old infants) by examining links with attachment (as measured in the Strange Situation Procedure). Biringen et al. (2008, 2012) studied 57 infants/toddlers and their child care providers, coding EA Scales on ½ h of naturalistic, videotaped interactions in center-based child care and completing the Attachment Q-Sort (AQS), based on 2 h of naturalistic, direct observations in the same setting); these authors also reported construct validity of the EA Scales in relation to attachment.

Altenhofen, Clyman, Little, Baker, and Biringen (2013) reported on the relation between the EA Scales and mother-reported attachment, using the Attachment Q-Sort (AQS) (Waters & Deane, 1985). Using a sample size of 114 3-year-olds and their foster caregivers in several contexts (e.g., episodes of play and clean up, snack, and completion of questionnaires) they found convergent validity between maternal sensitivity, child responsiveness, and child involvement and child attachment using the mother-reported AQS.

There is also clear indication that the EA Scales do not predict attachment under all circumstances. For example, van den Dries, Juffer, van IJzendoorn, Bakermans-Kranenburg, and Alink (2012) reported that EA sensitivity among adoptive families was just as likely to be associated with secure as insecure attachment, as well as disorganized/organized groups. This lack of relation held at both time 1 (2 months after adoption) and time 2 (six months after adoption) in this sample with 92 adoptive primary caregivers and their internationally adopted children, at age 11–16 months. It is possible that only 8 min of free play observation should not be used if the goal is to predict attachment, either because the context is a low-stress situation for many (though perhaps not all) mothers or because such a brief interaction may not be sufficient to reveal individual differences in relational capacities. Recall that Waters and Deane (1985) suggest a minimum of 2–3 h of direct observation under naturalistic circumstances before assessing attachment using the Attachment Q-Sort. Din, Pillai Riddell, and Gordner (2009) have conducted extensive work in pediatric clinics in Canada; they reported significant links between the EA Scales, the infant's pain expressions, and pain regulation, again providing evidence for convergent validity and cross-cultural applicability. See Table 1 for more information.

EA's sensitivity to change in prevention/intervention studies

An important psychometric property is an instrument's "sensitivity to change", that is, whether an instrument can detect changes that have taken place as related to therapeutic efforts or a program of intervention. Table 2 summarizes the prevention/intervention projects, which indicate that this is a promising measure for detecting change.

In the area of adoption, Garvin et al. (2012) compared internationally-adopted children who were cared for either in institutions or foster care prior to adoption with each other, and with non-adopted children. They reported that post-adoption EA could moderate or lessen the relations between early

Table 1
Summary of empirical articles using the EA scales.

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Altenhofen et al. (2010)	24 mother–child dyads	12–73 months	30-min free play in lab	Community sample, Divorcing, Shared custody, US, diverse	Mother-reported Attachment Q-Sort; inter-parent communication; age of overnight stays	Inter-rater reliability only	EA child involvement predicts Attachment Q-Sort (*convergent validity*); age of overnight stays did not predict EA or Attachment Q-Sort (*discriminant validity*)
Altenhofen et al. (2013) (4th edition)	104 foster mother–child dyads;	3 years	17-min free play (location not stated)	US, diverse	Mother-reported Attachment Q-Sort	Inter-rater reliability only	EA predicted Attachment Q-Sort (*convergent validity*)
Atzaba-Poria et al. (2010)	67 children and their mothers and fathers (34 with non-organic failure to thrive)	1–3 years	5 min structured play, 2 min clean up and 12 min free play	Children with feeding disorders from a clinic; control group from community sample; Israel	Parental involvement measure to measure responsibility for daily care	Inter-rater reliability only	EA less positive in the feeding disorders group for both mothers and fathers (sensitivity, structuring, and non-intrusiveness for mothers and sensitivity and non-intrusiveness for fathers)
Aviezer et al. (1999)	48 mother–infant dyads	Infants 14–22 months	Teaching task (exact duration not stated)		Strange Situation; Adult Attachment Interview	Inter-rater reliability only	Positive association between EA and attachment (*convergent validity*). No relation between EA and temperament (divergent validity); *cross-cultural validity* in Israel
Aviezer et al. (2003)	704 mother–infant dyads	Infants	Strange situation	Community sample, diverse; Israel	Attachment; Comparison of mother, relative, nanny, or group day care	Inter-rater reliability only	Positive association between attachment and EA for those in individual care (*convergent validity*); the association between maternal EA sensitivity and attachment security is moderated by group care; *cross-cultural validity* in Israel
Baker et al. (in press)	12 mothers; 3 fathers; infants between 23 and 62 months	Infants between 23 and 62 months	20-min free play at home	Diverse, US	EA2 Clinical Screener; Attachment Q Sort; Parenting Stress Index	Inter-rater reliability only	Correlations between EA and attachment as well as stress (*convergent validity*)
Baker and Biringen (2012) (4th edition)	57 providers	Infants	30-min child care observations	Diverse; US	EA2 Clinical Screener; Attachment Q Sort	Inter-rater reliability	EA Scales and EA2 Clinical Screener predicted attachment security (*convergent validity*)

Belt et al. (2012) (4th edition)	1 mother with her infant; case study	Not Stated	Strange Situation, Adult Attachment Interview	History of family trauma (suicide), substance abuse during early pregnancy; Finland	Infant psychotherapy, EA Scales	n/a: Case study, but trained coders	Change in EA, Adult Attachment Interview, and Strange Situation Procedure over the course of psychotherapy for a single case (*qualitative information about validity*); *cross-cultural validity* in Finland
Biringen and Allender (2011) (4th edition)	1 mother 3 children; case study	Mothers and pre-kindergarten	Home (several hours)	Lower-income custody case, US, Hispanic	Adult Attachment Interview	n/a: Case study, but trained coders	Change in EA and Adult Attachment Interview over the course of psychotherapy for a single case (*qualitative information about validity*). Ethnic validation (US Hispanic)
Biringen et al. (2012)	57 providers	11–36 months	30 min observations in child care centers	Community sample, US diverse	Attachment Q-Sort, Arnett Child Interaction Scale	Inter-rater reliability only	Correlations between EA and attachment as well as other qualities of the professionals in child care (*convergent validity*)
Biringen et al. (2000)	35 mother–child dyads	Pre-kindergarten 4–5 year olds	20-min mother–child play session 15 min free/ fantasy play; 5 min structured Etch-a-Sketch)	Range in SES, community sample, US, diverse	Adult Attachment Interview	Inter-rater reliability only	Adult Attachment Interview predictive of EA dimensions, except non-intrusiveness and non-hostility (*partial evidence for convergent validity*)
Biringen et al. (2005)	36 mother–infant dyads	Infancy (11–13 months)	1-h naturalistic home observation	SES, community sample, US, diverse	Attachment, social skills	Inter-rater reliability only	Positive association between attachment and EA that increases with length of observation time (*convergent validity*)
Biringen et al. (1999)	46 mother–infant dyads	9, 12, 14 months	1 h long naturalistic observation	Community sample, US, primarily Caucasian	Affect exchanges, gender differences	Inter-rater reliability only	Affectively positive mother–son interactions occur in the context of other positives (*convergent validity for boys*), whereas this is not the case for girls; equal levels of EA for mother–son and mother–daughter interactions; moderate *stability* over 9–14 months
Biringen et al. (1995)	57 mother–infant dyads	9, 12, 14 months	1 h in-home naturalistic observation	Middle to upper SES, community sample, early versus late walkers, US	Age of upright walking; positive and negative hedonic tone "testing of wills" (Maternal sensitivity used)	Inter-rater reliability only	Earlier walkers, but not later walkers, showed a rise in positive affect and "testing of wills" across the transition to walking (*convergent validity* for the earlier walkers); moderate *stability* 9–14 months

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Biringen et al. (2010)	32 mother–child dyads	0–14 years	20-min free play in homes	2 samples: Low-income; Middle-to-high income; US, Caucasian	Parenting Stress Index	Inter-rater reliability only	EA correlated in meaningful ways with parenting stress and perceptions of the child (*convergent validity*)
Biringen et al. (2000)	40 mother–child dyads	18, 24 and 39 months	Play interactions	Diverse US, community sample; Majority Caucasian	Maternal representation of self as parent	Inter-rater reliability only	Maternal representations associated with the dimensions of EA (*convergent validity*); moderate *stability* over time
Biringen et al. (2008)	57 providers	Infants 18–23 months and care providers	30 min center-based child care observations	Diverse US	Attachment Q-Sort and Arnett	Inter-rater reliability only	EA associated with Attachment Q-Sort (*convergent validity*). Qualitative description of intervention
Biringen et al. (2005)	57 mother–child dyads	4–5 year olds	20 min observations in lab	Diverse; US	Loneliness, social skills, behavior problems, expressive language	Inter-rater reliability only	School readiness was related to multiple dimensions of EA measured prior to school entry (*convergent validity*)
Bornstein, Gini, Leach, et al. (2006)	34 mother–child dyads	2 years	Home versus laboratory (8 min)	Middle-to-upper-middle SES, community sample; US	No other variables	Inter-rater reliability; test–retest reliability, home versus lab one week apart	Adequate psychometric properties of the instrument; significant cross-context reliability and continuity in EA
Bornstein, Gini, Putnick, et al. (2006)	34 mother–child dyads	2 years	Home versus laboratory, 8 min each of free play during a 1 week period	Middle-to-upper-middle SES, community sample; US; Caucasian	No other variables	Inter-rater reliability; one-week test–retest reliability between home and lab	Significant cross-context reliability and continuity in EA
Bornstein, Gini, Suwalsky, et al. (2006)	52 mother–child dyads	5–6 months	2 naturalistic home observations, daily activities(1 h)	Diverse SES, US	No other variables	Inter-rater reliability; test–retest reliability, observed twice in the home one-week apart	Significant short–term *stability* and continuity in EA
Bornstein et al. (2008)	220 mother–infant dyads	20 months	10-min Home (naturalistic)	Diverse SES, Primiparous	Intra-national and cross-national; age,	Inter-rater reliability;	Regional and country differences in mother–child EA; Italy high

				with term, non-adoptive, healthy infant; US, Argentina, Italy	gender, region, and country variation	test–retest reliability	functioning in terms of EA, rural mothers demonstrate more intrusiveness; Gender differences in mother–child EA (*early study of cross-national application and establishment of reliability*)
Bornstein et al. (2010)	220 mother–infant dyads	5–20 months	15–20 min free play in home	Low-to-upper income; US, Argentina, Italy	No other variables	Inter-rater reliability only; test–retest reliability	EA varied by country, with Italy the highest, and US and Argentina similar; scales were moderately stable over infant age 5–20 months and similar across genders, regions, and countries; decrements in EA between infancy and toddlerhood (like other studies) but especially for the boys (moderate *stability* over time); *Cross-national application*
Campbell (2007)	2 cases	19 months	20-min home Free play	Middle income, children with visual impairment; Australia	Language measures	n/a: Case studies, but trained coders	Qualitative description of contrasting interaction styles of mothers with their children, with visual impairments. *Cross-cultural application in Australia*
Campbell and Johnston (2009)	4 cases	18–19 months	30-min home Free play	Middle-income, children with visual impairment; Australia	Language measures	n/a: Case studies, but trained coders	Qualitative description: Child-centered verbalizations rather than other-centered verbalizations are commonly used, and interpreted as a need to highlight and accentuate emotions and feelings for the child with visual impairments. *Cross-cultural application in Australia*
Carter et al. (2001)	69 mother–child dyads	4, 14 and 30 months	Lab play (duration of time not indicated)	Diverse, US	Maternal depression, attachment, social/emotional adjustment	Inter-rater reliability only	Positive association between attachment and EA (*convergent validity*); interactions associated with comorbid diagnostic status. *Diverse ethnic application: Substantial African-American subsample*

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Cassibba et al. (2012)	40 mother–infant dyads	14 months	3-min free play after the Strange Situation Procedure	Premature infants, infants with atopic dermatitis and full-term healthy infants; clinical versus comparison group; Italy	Maternal attachment representation, mother/child attachment and clinical status	Inter-rater reliability	EA not associated with attachment in the group with health difficulties (*lack of convergent validity*) and the expected intergenerational transmission of attachment was not found under such conditions. *Cross-cultural application in Italy*
Chaudhuri, Easterbrooks, and Davis (2009)	313 mother–child dyads	Young mothers (<21 years) and infants (14 and 20 months)	Free play and structured teaching task (5 min each)	Adolescent Mothers of European American, Latin American, and African American backgrounds, low SES; US	Maternal bonding instrument; parenting practices	Inter-rater reliability only	Lower SES groups more hostile than higher SES (*convergent validity*). *Ethnic subgroups, but not a comparison of these groups*
Coppola et al. (2006)	31 mother–infant dyads	Mothers: 19–42 years; infant age not stated	3-min free play in the home	Middle-class SES, community sample; Italy	Adult Attachment script representations	Inter-rater reliability only	Adult Attachment Interview predictive of maternal sensitivity (*convergent validity*). *Cross-cultural application in Italy*
de Falco et al. (2009)	44 mother–child dyads	Toddlers (18–50 months)	10-min play session observations	Down Syndrome, low to middle SES; Italy	No other variables	Inter-rater reliability only	Mothers and fathers exhibited similar EA levels with their children with Down Syndrome; *stability* of interactions across interactions with the two parents, filmed consecutively. *Cross-cultural application in Italy*
Derscheid (2013) (4th edition)	50 mother–child dyads	2–4 yr olds	Home	Caucasian, Hispanic, African American; community sample, US	Dyadic Parent Child Interaction Coding System (DPICS)	Inter-rater reliability only	Psychometric testing of EA among *different races/ethnicities* in US (Caucasian/Hispanic/African-American) and comparisons between them
Din et al. (2009)	73 mother–infant dyads	3–20 months (full term)	Inoculation context in primary care (few mins.)	Sample from high-risk community with	Infant pain measures	Inter-rater reliability only	Maternal non-intrusiveness correlated with greater child's pain expression at 1 min post

				majority of mothers having a high school degree or higher; Canada; Mixed race and ethnicity			inoculation, Greater maternal sensitivity and overall EA correlated with lower infant pain expression (*convergent validity*). *Cross-cultural application in Canada*
Dolev et al. (2009)	45 mother–child dyads	32–69 months	Free play (8 min), clean up, structured play (5 min), social play (5 min)	Diverse, Israel	Autism Spectrum Disorders, Autism Diagnostic Observation Schedule	Inter-rater reliability only	Children with ASD highest EA when participating in social play, lowest in free play; mother's psychological stress associated with EA (*convergent validity*). *Cross-cultural application in Israel*
Dombrowski et al. (2005)	1 mother–child	Toddler	5 min child-directed play	Low-income, Court ordered intervention, previous foster family, possible in utero drug exposure; US	Dyadic Parent–Child Interaction System	n/a: Case study, but trained coders	*Qualitative information* about EA in the context of Parent Attunement Therapy
Easterbrooks et al. (2000)	45 mother–child dyads	18 months, 7 years	5–10 min mother–child reunion	High psychosocial risk, Low SES; US; Primarily European American	Maternal depression, Infant attachment in the strange situation, EA measured in middle childhood	Inter-rater reliability only	EA predictable relations with attachment and maternal depression (*convergent validity*)
Easterbrooks et al. (2012)	43 mother–child dyads	Middle childhood (7–8 years of age)	5-min reunion following 1 h of separation	Low income, single parent mothers; US	Maternal depression; attachment (including controlling and disorganized)	Inter-rater reliability only	EA (assessed at 7 years) predictable relations with maternal depression; Association between EA and middle childhood disorganized attachment (*convergent validity*)
Easterbrooks et al. (2005)	80 mothe–infant dyads	10 months	5-min free play	Adolescent mothers; US; Diverse ethnicity	Maternal perception of childhood relationships; maternal depression	Inter-rater reliability only	Developed/used an EA composite (through cluster analysis). EA was used in the context of separation–reunion situations
Edelstein et al. (2004)	39 caregiver–child dyads (all but 4 were mothers)	3–7 years	Child inoculation	Diverse SES, community sample; US mixed race, ethnicity	Behavior problems; self-reported attachment style	Inter-rater reliability only	Avoidant mothers score low in EA during child inoculation (*convergent validity*)

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Espinet et al. (in press) (4th edition)	34 mothers	12–40 months	20-min free play in clinic	Substance-abusing mothers; Canada	Substance use measure, DC 0–3 PIRGAS, Parenting Stress Index	Inter-rater reliability only	Ratings on the Emotional Attachment and Emotional Availability (EA2 Clinical Screener) and adult dimensions of the EA Scales (particularly maternal sensitivity), but not child dimensions, were associated with clinician ratings on the PIR-GAS (*convergent validity*). *Cross-cultural application in Canada*
Flykt et al. (2012) (4th edition)	51 drug-abusing mothers; 50 non-abusing mothers	4 and 12 months	Mother–infant free-play (7–10 min)	Substance-abusing and non-abusing mothers; Finland	Substance abuse information, maternal representations, and maternal perinatal depression	Inter-rater reliability only	Negative and idealized prenatal representations of the self-as-mother predicted mother–infant EA problems; negative change in representation harmful to EA for all mothers; increasing idealization from perinatal to postnatal considered harmful (*convergent validity*). *Cross-cultural application in Finland*
Fonseca et al. (2010)	80 postpartum depressed mothers and their infants	4–36 months	15-min free play in lab	Postpartum depressed, non-depressed mothers; Brazil	No other variables	Inter-rater reliability only	No differences in EA between postpartum depressed and non-depressed mothers (*lack of convergent validity*) bur relation between EA sensitivity and social support, education, and attachment styles (*convergent validity*); *Cross-cultural application in Brazil*
Garvin et al. (2012)	119 adoptive mother–child dyads	18, 30, and 36 months	Free play (10 min)	Adopted children from overseas orphanages; US, Russia/Ukraine, China, Guatemala, Korea; non-adoption children	Joint attention, indiscriminate sociability	Inter-rater reliability only	Parent EA was positively correlated with child emotion understanding, initiation of joint attention, as well as indiscriminate sociability (*convergent validity*). *Different* cultures represented but not a comparison of them

Gocek et al. (2007)	78 mothers and their children	12–30 months	15-min free play and sharing of a snack brought from home in lab setting	Clinic (bonding issues, feeding, sleeping, maternal depression) and non-clinic populations; Canada	Mental state language	Inter-rater reliability only	Non-clinic mothers used more mental state words, but no significant relation between EA and mother's use of mental state language (mentalization ability); no significant differences in EA among clinic versus non-clinic mothers (*lack of evidence of convergent validity*). *Cross-cultural application in Canada*
Goldman-Fraser et al. (2010)	48 mother–infant Dyads	Mothers: 19–38 years Infants: 2–5 months	10-min free play	Low SES, Prenatal-care/ substance-abuse treatment participants; African-American; White, Non-Hispanic	Life stressors; symptom checklists	Not reported	Poorer EA functioning in clinic group, as compared to socioeconomically matched, comparison group
Gueron-Sela et al. (2011)	27 non-organic-based feeding disorder (Non-organic Failure to Thrive) and 28 children without (community sample), and their mothers	Mean age 1.85 years in feeding disorder group and 2.03 in the other group	12-min feeding interactions	Israel	Maternal worry about undereating	Inter-rater reliability only	Maternal child underweight worries related to EA in the feeding disorder group; feeding disorder group not at risk per se, but only when couples with maternal anxiety about weight gain
Harel et al. (2002)	54 mother–child dyads	Toddlers 12 and 20 months	3-min free play plus 3-min structured play	Community sample; Israel	Mirror self-recognition	Inter-rater reliability only	Child responsiveness was associated with infants' earlier mirror self-recognition (*convergent validity*). *Cross-cultural application in Israel*
Howes and Hong (2008)	53 mother–child dyads	Pre-Kindergarten	Home (25 min free play; 5 min structured)	Low-income; Mexican–American heritage; Spanish-speaking mothers	(Peer and adult) social relationships in child care	Inter-rater reliability only	Maternal sensitivity and structuring predicted child social competence (*convergent validity*). *Cross-cultural application for Mexican–Americans*

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Howes and Obregon (2009)	78 mother–child dyads	Infancy to pre-school	30-min free play in the home (ratings done on 4 occasions between infancy and preschool)	Mexican heritage, documented and undocumented migrants (Early Head Start); Spanish-speaking mothers	Readiness for entry into kindergarten, social competence, play	Inter-rater reliability only; test–retest reliability (four times from infancy to preschool)	Mothers with lower EA scores and used child care had children with less complex play in pre-kindergarten. Mothers with higher EA scores and used child care had children with higher social competence at pre-kindergarten (*convergent validity*); many EA dimensions increased over time. *Cross-cultural application for Mexican–Americans*
John et al. (2012) (4th edition)	47 mother–child dyads	3–6 years	8–14 min free play in lab	Children with intellectual disabilities; India	Attachment; child adaptive behavior	Inter-rater reliability only	*Child EA* (not mother EA) predicts attachment in children with intellectual disabilities; severity of the disorder was important (*convergent validity for the importance of the child component of the system*). *Cross-cultural application for Indians living in India*
Kang (2005)	S1: 87 S2:85 S3: 67	1.5–6 years	8 episodes totaling 30 min of play in either home or an office at the children's hospital	High-risk for behavior problems; Caucasian, African American, Hispanic, and Asian	Maternal psychological well-being, behavior problems	Inter-rater reliability only	EA predictive of internalizing and externalizing behavior at school (*convergent validity*)
Kaplan et al. (2008)	47 mother–infant dyads	Pregnant mothers, infant four months	10-min free play	Low risk; US; diverse race, ethnicity	Antenatal psychiatric status, heart rate, salivary cortisol, infant temperament	Inter-rater reliability only	Higher maternal sensitivity associated with greater positive affect and engagement from child; antenatal diagnosis together with maternal sensitivity predicted infant baseline cortisol levels (*convergent validity*)
Kertes et al. (2009)	274 mother–child dyads	Preschoolers	10 min free play; 20 min structured play	Community sample; US	Child cortisol; Child temperament	Inter-rater reliability only	Higher mother–child EA was associated with the regulation of stress responses of highly

							inhibited children to social threats (*convergent validity*) but not non-social threats (*divergent validity*)
Killeen and Teti (2012)	27 mother–infant dyads	5–8 months	Home	Community sample, screened for depressive and anxious symptoms (excluded if so); US	EEG recordings, self-report of emotional experiences while watching infant videos with discrete emotions, Maternal internalizing symptoms	Inter-rater reliability only	EA was associated with a shift toward right frontal activation in response to infant emotions (in-the-moment empathic responding) (*convergent validity*)
Kogan and Carter (1996)	29 mother–infant dyads	4 months	3-min reunion after the still face	Low SES, WIC; US	Infant affect regulation	Inter-rater reliability only	Infants of insensitive moms showed higher levels of avoidant and resistant behavior during engagement (*convergent validity*)
Koren-Karie et al. (2009)	45 mother–child dyads	Pre-school	In laboratory, 8-min free play and then cleanup, 5 min structured, and 5-min social play	Autism Spectrum Disorders, male; Israel	Maternal sensitivity and secure attachment; Autism Diagnostic Observation Schedule	Inter-rater reliability only	Mothers of securely attached children were more sensitive to their children, even when controlling for the severity of ASD (*convergent validity*). *Cross-cultural application for Israel*
Lam and Kitamura (2010) (4th edition)	2	17–22 months	Home	Middle income, Australia	Language measures	n/a: Case studies, but trained coders	Qualitative information: EA was higher for the typically-developing twin, as compared to the twin with hearing impairment. *Cross-cultural application in Australia*
Lawler (2008)	106 mother–child dyads (kinship and non-kinship foster mothers)	2–8 years old	Semi-structured lab play sessions	Maltreated; US	No other measures	Inter-rater reliability only	EA for foster kin versus non-kin not significantly different, suggesting that kinship foster care need not have an advantage or disadvantage
Lehman et al. (2002)	51 mother–toddler dyads	Toddlers 15–31 months	20-min free play in laboratory setting plus clean up	Middle to upper income, SES, community sample; US	Maternal personality measure; child temperament; compliance measures	Inter-rater reliability only	Mothers who showed higher sensitivity and structuring had children who were more obedient with their mothers (*convergent validity*)
Lemsche (2003)	40 mother–child dyads	3–6 year olds	15–20 min free play in lab	Middle income; Germany	Child behavior problems, emotion regulation, play narratives	Inter-rater reliability only	Relation between EA and these additional measures, in this attempt to validate emotion regulation measure (*convergent validity*. *Cross-cultural application in Germany.*

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Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Licata et al. (2013)	37 mother–infant dyads	7 month olds	10-min free play in lab	Lower-to-middle income; Germany	Maternal mind-mindedness, child temperament (activity level), goal-encoding task	Inter-rater reliability only	EA predicts "goal-encoding" as an index of social-cognitive development; mind mindedness is related to EA but not predictive of goal encoding; temperament marginally predictive of goal-encoding. *Cross-cultural application in Germany*
Little and Carter (2005)	45 mother–child dyads	12 months	3-min reunion after still face paradigm	Low SES, primarily unmarried mothers; US; African American majority	Negative emotional reactivity; Emotion regulation	Inter-rater reliability only	Lower SES groups more hostile than higher SES; higher mother–child EA associated with greater infant emotion regulation during challenge situation (*convergent validity*)
Lok and McMahon (2006)	89 mother–child dyads	4 years	20-min free play in the home	Middle class SES, participants of a maternal support group working with infant difficulties; Australia	Mind mindedness	Inter-rater reliability only	Chronically depressed mothers with cognitive distortions had lower EA than non-depressed moms; Mothers who took child's perspective were less hostile (*convergent validity*). *Cross-cultural application in Australia*
Lovas (2002)	113 Mother–child and father–child dyads	Toddlers 19 and 24 months	7-min free plays with each parent; 5 min clean ups in the laboratory	Middle SES, mother–toddlers and father–toddler dyads, community sample; US; Majority Caucasian	No other variables	Inter-rater reliability only	Positive association of parent and child EA was found with male toddlers' language development (*convergent validity*)
Martins et al. (2012)	52 mother–infant dyads	10 months	30-min home interaction (20 min naturalistic plus 10 min free play)	Community sample; Portugal	Emotion over-regulation; Strange Situation; infant temperament	Inter-rater reliability only	Relations were found between EA and emotion regulation (*convergent validity*) but not with attachment (*lack of convergent validity*). *Cross-cultural application in Portugal*

McCarthy et al. (2003)	243 mother–child dyads	2 weeks, 6, 15, and 24-months	Well child care visits, 2-min direct, non-videotaped observations	Community sample; diverse SES, well-child visits versus acute illness-related visits; US	Acute pediatric illness	Inter-rater reliability only	Resource use associated with EA, maternal sense of competence, and maternal view of the severity of the illness. EA predicted greater resource use (direct effect, not mediated by other variables) (*convergent validity*)
Möehler et al. (2007)	119 mother–infant dyads	5 months	10-min lab play session	Maternal history of abuse, Germany	Maternal abuse screening	Inter-rater reliability only	Mothers with a history of maltreatment were more intrusive than control group (*convergent validity*). *Cross-cultural application in Germany*
Moreno et al. (2008)	661 mother–child dyads	15, 21, 24 months and 4 years	Lab- or home-free-play (duration not stated)	First time mothers who were participants in a home-visitation program for low-income mothers; US, ethnically diverse	Maternal psychological characteristics, Infant temperament, cognitive and language skills, empathy	Inter-rater reliability only	Child's cognitive and social resources are as important as parental sensitivity to the child's development of empathy (*convergent validity of the child EA as a construct*)
Murray-Kolb and Beard (2009)	95 mother–child dyads	10 weeks (for mother scales) and 9 months (for child scales)	20-min free play in health clinic	6–8 week postpartum women, iron-deficient anemic or iron-sufficient; South African descent women	Iron supplement	Inter-rater reliability only	Lower maternal iron deficiency is related to lower EA. *Cross-cultural application in South Africa*
Naber et al. (2013)	32 father–child dyads	1.5–6 years	15 min play sessions	Toddlers with Autism Spectrum Disorders, typically developing toddlers and their fathers; Netherlands	Nasal oxytocin	Inter-rater reliability only	Lower paternal oxytocin related to lower EA, for fathers with children with ASD. *Cross-cultural application in the Netherlands*
Naber et al. (2010)	17 father–child dyads		15-min play sessions	Fathers, community sample; Netherlands	Nasal oxytocin	Inter-rater reliability only	Lower paternal oxytocin related to lower EA, for fathers. *Cross-cultural application in the Netherlands*

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Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
Nicolson et al. (2013)	73 mother–infant dyads		20-min free play; separation–reunion	Adolescent mothers; culturally diverse; Australia	Attachment intervention	Inter-rater reliability	EA higher in the intervention as compared to the control group (but this was even higher when the separation–reunion episode was included), providing important information on the importance of context
Merras-Salmio et al. (2013)	24 mother–infant dyads	10 months	15–20 min Free play	Randomly selected group of children with suspicion of cow's milk allergy; Finland	No other measures	Inter-rater reliability only	Lower EA in mother–child relationships where there is cow's milk allergy, as compared to normative data (*Convergent validity*). *Cultural applicability*
Olds et al. (2002)	735 mother–infant dyads	Pregnancy, birth to two years	10-min free play	Low SES, no previous live birth, qualifies for Medicaid or has no private insurance; US	Numerous health related measures	Inter-rater reliability only	Improved EA sensitivity with first time mothers
Oyen et al. (2000)	30 mother–child dyads	18–42 months	30-min play in the home	Low SES, majority single mothers; Canada	Adult Attachment Interview, risk checklist	Inter-rater reliability only	Adult Attachment Interview predictive of the dimensions of EA (*convergent validity*). *Cross-cultural application in Canada*
Pillai Riddell et al. (2011) (4th edition)	731 mother–infant dyads	2–12 month olds	Few min during inoculations; Pediatric setting	Community sample; Canada, Diverse	Infant pain behavior	Inter-rater reliability; test–retest reliability in pain contexts	Caregiver sensitivity is best predicted by earlier sensitivity, rather than infant pain behavior (*divergent validity*); the link between sensitivity and pain behavior is most clearly seen after the attachment relationship forms (12 months) (*convergent validity*). *Cross-cultural application in Canada*
Pipp-Siegel (1996)	42 mother–child dyads	12, 18, 24 months	30-min free play in the home	Comparison between low-risk toddlers, toddlers with risk for	Language measures	Inter-rater reliability only	Deaf and hearing-impaired children, significant connection between EA and progress in linguistic development (*convergent*

				maltreatment and deaf toddlers of hearing parents; US			*validity*)
Pipp-Siegel et al. (1998)	48 mother–child dyads	18–29 months	10-min free play	Deaf or hearing impaired children with hearing mothers and hearing toddlers with hearing mothers; US	Physical touch; All involved in the Colorado Home Intervention Research Project	Inter-rater reliability only	Hearing impaired mothers/children touched each other more than controls, potentially an important modality for communication; mothers of hearing impaired children were more hostile but also more structuring (*convergent validity*)
Pressman et al. (1999)	24 mother–child dyads	21–30 months	30-min home free-play	Deaf or hearing impaired children with hearing mothers; US	Language measures; only sensitivity measure used	Inter-rater reliability only	Maternal sensitivity associated with positive expressive language gain (*convergent validity*)
Pressman et al. (1998)	42 mother–child dyads	15–21 months	30-min free play in the home	Deaf or hearing impaired children with hearing mothers and hearing toddlers with hearing mothers; US	Language measures; All involved in the Colorado Home Intervention Research Project	Inter-rater reliability only	Deaf and hearing-impaired children; significant connection between EA and progress in linguistic development (*convergent validity*)
Racine et al. (2012) (4th edition)	606 mother–infant dyads	2, 4, 6, 12 months	Few minutes during inoculations	Pediatric clinic patients, community sample; Canada	Verbal reassurance; pain responses	Inter-rater reliability only	EA negatively related to verbal reassurance at 12 months when attachment is consolidated (*convergent validity for link with attachment*); EA not significant moderator. *Cross-cultural application in Canada*
Rethazi (1999)	40 mother–child dyads	3 and 6 years	10-min free play, 1 h parent–child interaction	Aggressive and/or noncompliant preschoolers; Canada	Working Model of the Child Interview, child behavior problems	Inter-rater reliability only	Adult Attachment Interview predictive of the dimensions of EA (*convergent validity*). *Cross-cultural application in Canada*
Robinson and Little (1994)	150 pairs of twins and their mothers	36 months	10-min semi-structured play in the home	Same-sex monozygotic and dizygotic twins; US	Empathy measures, cognitive/language	Inter-rater reliability only	Maternal EA is similar toward twins but child EA (responsiveness and involvement) is not similar. That is, children in the family system can relate quite differently

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
							despite being treated in similar ways (*further construct validity that the child and maternal sides can be different, and thus support for the child EA construct*)
Robinson et al. (1993)	70 mother–child dyads	18–24 months	16–20 min semi-structured home play	Middle-income; US	Discrete codings of affect exchanges	Inter-rater reliability only	Maternal sensitivity was associated with maternal matching of sons' affect but daughters' active creation of affective states with mother (convergent validity with discrete measures, in gender-expected directions)
Sagi et al. (2002)	758 mother–child dyads	Infant 6 and 12 months	15-min free play in the home at 6 months; 6-min free play in lab at 12 months	Diverse SES, Israel	Attachment	Inter-rater reliability only	Maternal EA sensitivity predicts child attachment (*convergent validity*); center-based care increased the frequency of infant attachment insecurity. *Cross-cultural application in Israel*
Salo et al. (2009)	13 mother–child dyads	3 years	5-min free play in clinic	Drug-exposed and non-exposed mothers/ children; Finland	Cognitive development; self-efficacy	Inter-rater reliability only	3-year-olds who remained with their biological mothers scored lower on cognitive and language measures as well as on child responsiveness and involvement, while their mothers scored lower on sensitivity and non-hostility. Maternal self-efficacy beliefs among the drug-abusing mothers were lower than among foster mothers, whose results did not differ from those of normative/biological mothers (convergent validity). *Cross-cultural application in Finland*
Salo et al. (2010)	87 mother–infant dyads	5–12 months	4-min free play clinic	Opiate-abusing mothers, depressed mothers and unexposed	Cognitive development	Inter-rater reliability only	Substance abusing mothers scored lowest in sensitivity, structuring, and non-intrusiveness (*convergent validity*). *Cross-cultural*

				mother–infant dyads; Finland			*application in Finland*
Scher (2001)	37 mother–infant dyads	One year olds	10-min free play in lab	Community sample; Israel	Child sleep regulation; Parent–child early relational assessment	Inter-rater reliability only	EA during the day (free play) seemed unrelated to optimal sleep patterns; infants who were higher in responsiveness and involvement during play woke up more frequently at night, interpreted as an age-related phenomenon (*not clear this is evidence of convergent validity*). *Cross-cultural application in Israel*
Schneider et al. (in Press) (4th edition)	11	5–11 years	30-min school setting, structured play(human animal team; school professional, child, dog, dog owner)	Males at high-risk for internalizing and externalizing behaviors; US; Caucasian and African American	Animal assisted therapy	Inter-rater reliability only	EA is related to lower disciplinary referrals in school
Shivers (2008) (summary of 4 different projects)	(1) 48 providers; (2) 17 providers; (3) 9 providers with 13 ASD children; (4) 46 providers	Infant to preschool	(1) Child care homes (1–2 h); (2) child care homes; (3 h); (4) 3–4 h	(1) Low-income; (2) middle-income;(3) middle-income; (4)low-income African American; US	Adult depression, environment quality	Inter-rater reliability only	EA associated with other measures used in child care, attachment (*convergent validity*)
Stack et al. (2012)	S1: 109 mother–child dyads; S2: 35 mother–child dyads	Infancy, Preschool, Middle childhood	Home 15-min free play	Low SES, at-risk; Canada	Measurement of the environment in the home, measures of support, Parenting Stress Index	Inter-rater reliability only	Mothers with history of internalized or externalized aggression showed more EA hostility (*convergent validity*). *Cross-cultural application in Canada*
Steier and Brauch-Lehman (2000)	50 mother–child dyads	15–31 months	20-min free play lab	Middle-to-upper income; US	Maternal personality, soft object attachment	Inter-rater reliability only	No relation between EA and soft object attachment (l*ack of convergent validity*)
Susman-Stillman et al. (2013)	59 family child care providers and 39 center-based providers, each with a focal child	Infants/toddlers	30–45 min 3 time points across the year	Middle-class, educated sample	Attitudes and beliefs	Inter-rater reliability	Center-based providers more variable than family care providers (*less stability*)
Sutherland et al. (2012)	47 mother–child dyads	1–8 years	20-min semi-structured play, university lab	Divorcing versus intact families; US	Attachment Q-Sort	Inter-rater reliability only	Lower levels of EA when divorcing compared to intact

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
							families; children who involved their mothers were more secure (*convergent validity*)
Swanson et al. (2000)	51 mother–child dyads	1 month, 6 months 18 months	10 min play	Maternal prenatal drug abuse; US, ethnic minority	Strange situation	Inter-rater reliability only	Substance abusing moms more likely to be intrusive; Negative association between non-intrusiveness and disorganized attachment (*convergent validity*)
Teti et al. (2010)	45 mother–infant dyads	5 weeks - 25 months	6–123 min of bedtime	Diverse SES; US; Maj; Community sample; ority Caucasian	Infant sleep diary, sleep questionnaire; parenting practices	Inter-rater reliability only	Mother–child EA at bedtime was found to be associated with infants' optimal sleep patterns (*convergent validity*); EA and maternal bedtime practices were uncorrelated (*divergent validity*)
Thomas and Zimmer-Gembeck (2011)	150 mother–child dyads	2 1/2 to 7 years	Only EA sensitivity used; 10-min, child-directed, free-play activity in the lab	High-risk for maltreatment; Australia	Discrete behaviors child behavior problems; child abuse potential;	Inter-rater reliability	Mothers involved in Parent Child Interaction Therapy showed improved EA sensitivity, even after PCIT completion *Cross-cultural application in Australia*
Timmer et al. (2011)	54 mother–infant dyads	2–7 years of age	Three 5-min structured situations (child-directed or mother-directed play), university clinic	Depressed/non-depressed mothers; US	Child behavior problems, parent verbalization patterns	Inter-rater reliability only	Depressed and non-depressed mothers showed similar levels of emotional availability at the start of PCIT and similar improvements from pre-to-post PCIT
Timmer et al. (2012)	232 mother–child dyads	2–7 years	Three 5-min structured situations (child-directed or mother-directed play), university hospital-based outpatient clinic	High-risk for maltreatment; US	Maternal history of maltreatment; Maternal physical abusiveness; inter-parental violence	Inter-rater reliability only	Physically abused children exposed to inter-parental violence were less optimally emotionally available and potentially over-responsive and over-involving (*convergent validity*)
Trapolini et al. (2008)	92 mother–child dyads	4, 12, and 15 months, 4 years	20-min unstructured play in the home	Residential patients of parent-craft center needing support for	Maternal depression, attachment; perspective taking	Inter-rater reliability only	Chronically depressed mothers with cognitive distortions had lower EA than non-depressed mothers; perspective taking moderated the link between EA

				infant settling and feeding difficulties, maternal depression; Australia			and depression (*convergent validity*). *Cross-cultural application in Australia*
Trupe (2010)	35 mother–child dyads	4–7 year olds	20-min free play in lab	Low-income mothers with Borderline Personality Disorder (BPD)and those with no diagnosis; US	Measure of borderline personality features: affective instability, identity disturbance, negative relationships, self-harm	Inter-rater reliability only	EA was not significantly different in mother–child dyads where the mother had a diagnosis of BPD versus not, but maternal borderline personality features (affective instability and negative relationships) were associated with lower maternal sensitivity, child responsiveness, and child involvement (*convergent validity. Illustrating link with features rather than diagnostic status per se*)
van den Dries et al. (2012)	92 mother–infant dyads	2 and 6 months after adoption	Home visits (8 min free play)	Adoptive families, post institutionalized or former foster care children; Chinese children, Dutch homes	Attachment, Indiscriminate friendliness (Maternal sensitivity and child responsiveness used)	Inter-rater reliability only	EA linked with indiscriminate friendliness (in meaningful ways) (convergent validity); *EA* not related to attachment or disorganized attachment (*lack of convergent validity*); *cross-cultural application in the Netherlands*
van Doesum et al. (2007)	84 mother–child dyads	1 month to 1 year	15-min of mothers bathing their infants	Mothers with depressive symptoms; Netherlands	Depression measure, parental incompetence measure	Inter-rater reliability only	Lower EA sensitivity for depressed mothers was associated with number of risk factors (including education, low income, social support deficits); *Cross-cultural application in the Netherlands*
Van Ee et al. (2012) (4th edition)	49 mother–child dyads	Mothers: 19–44 years; Child: 18–42 months	15-min unstructured play	Asylum seekers and refugees in the Netherlands; Eastern European, Russia, former Russia, Asia, Middle East, Africa	Traumatic events, PTSD, depression and anxiety, mental and psychomotor development	Inter-rater reliability only	Traumatized mothers have infants with lower levels of infant responsiveness and involvement; these mothers show lower levels of sensitivity, structuring, or hostility (but not intrusiveness) (*convergent validity*). *Cross-cultural application in the Netherlands*

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Table 1 (*continued*)

Author	Sample qualities	Age	Context	Population	Additional variables	Evidence of reliability	Evidence of additional psychometric information and cross-cultural validity
van IJzendoorn et al. (2007)	55 parent–child dyads (all but 6 were mothers)	14–15 months, 4 years	10-min free play(not clear from article if home/lab setting)	Autism Spectrum Disorder; Netherlands	Maternal sensitivity and child involvement used; attachment; cognitive development; adaptive behavior	Inter-rater reliability only	EA sensitivity associated with attachment, but only in the non-ASD group (authors state that "ASD challenges attachment theory", p. 597); Children with ASD less involving of their mothers (*convergent validity*). *Cross-cultural application in the Netherlands*
Venuti et al. (2008)	28 mother–child dyads	Toddler, 3 years	10-min play sessions in laboratory	Down Syndrome; Italy	Symbolic play	Inter-rater reliability only	Structuring and non-intrusiveness low in correlation in this sample (*important information about the EA construct's components and the need to keep these separate; sensitivity and structuring correlated, however*); Positive correlation between EA and symbolic play in the presence of mother (*convergent validity*) but not alone play (*divergent validity*). *Cross-cultural application in Italy*
Vliegen et al. (2009)	49 Mother–child dyads	4 months	Free play observation	Maternal depression, non-depressed mothers; Belgium	Postpartum clinically depressed mothers	Inter-rater reliability only	Depressed mothers had lower EA on all dimensions except non-hostility (*convergent validity*). *Cross-cultural application in Belgium*
Wiefel et al. (2005)	68 mother–child and 40 father–child dyads	6 weeks–3 years 10 months	5–10 min of free play with each parent	Child psychiatric population; Germany	ICD-10 Classifications: regulation, externalizing, attachment, and feeding disorders	Inter-rater reliability only	Group with feeding disorders showed the lowest EA (*convergent validity*). Lower the EA, the higher the intensity of (independently) recommended treatments. *Cross-cultural application in Germany*
Wünsche and Brisch (2010)	61 mother–infant dyads	14 months	Play and post-stress situation (after a separation)	Very low birthweight; Germany	Adult Attachment Interview; neurobiological status	Inter-rater reliability only	Higher trauma as related to the birth associated with lower EA, as much as 14 months later

Zelkowitz et al. (2009)	56 mother–infant dyads	Newborn, 24 months	Home free play (duration not specified)	Families with very low birth weight; newborns without congenital anomalies, NICU; Canada	Maternal anxiety measure from the NICU; medical risk score	Inter-rater reliability only	Mother's anxiety was not related to neonatal illness severity, but associated with maternal sensitivity and structuring, as well as child involvement (even controlling for maternal education and infant birth weight). Children of mothers with greater anxiety at the NICU less likely to involve them at 24 months (*convergent validity*). *Cross-cultural application in the Canada*
Zimmerman and Fassler (2003)	7 children, child care teachers, and their mothers	3–4 months at the start	90-min every 3 months, longitudinal for 9 months; Child care center observations or infant with mother and childcare teacher	Teen and very young mothers; US	No other variables	n/a: Case studies	Mostly qualitative information: Infants differentiated between mothers and teachers with respect to the quality of their responsiveness and involving behaviors toward them
Zimmerman and McDonald (1995)	6 children and their child care providers, parents	3–6 months at the start	10-h per week of observations at day care between child and teachers, own and others' parent, other infants; longitudinal every other month	Middle class SES; community sample; US	No other variables	n/a: Case studies	Mostly qualitative description of caregiver–child relationships in child care; each was unique and not based on the EA in the mother–child relationship
Ziv et al. (2000)	687 mother–infant dyads	12 months	6-min free play	Diverse SES, community sample; Israel	Attachment	Inter-rater reliability only	Positive association between attachment and EA, except maternal non-hostility; lower SES groups more hostile and less sensitive than higher SES (*convergent validity*). *Cross-cultural application in Israel*

Table 2
Is EA a sensitive indicator in contexts designed for change?

	Sample	Intervention	EA sensitive to change?
Garvin et al. (2012)	Internationally adopted children cared in institutions or foster care prior to US adoption	Adoption	Yes Children's adjustment, including disinhibited attachment, improved over time
van den Dries et al. (2012)	Children adopted from China and other countries into Dutch homes	Adoption	Yes Child responsiveness improved over time
Baker et al. (in press)	Adoptive families with a child under age 5	EA parent intervention, conducted through distance technology	Yes EA enhanced in the intervention but not control group
Biringen et al. (2010)	Parents and their children (0–14 years, low risk)	EA parent intervention	Yes Stress lowered; EA of both parent and child improved
Biringen et al. (2012)	Infants/toddlers spending at least half time in center-based care (low risk)	EA child care intervention	Yes Infants/toddlers became more securely attached and teachers became less detached, hostile, and more supportive. Children and teachers became more emotionally available to one another
Nicolson et al. (2013)	Adolescents and their infants	Attachment based intervention	EA improved in the intervention but nt control group; prediction improved when the separation–reunion context coding of EA was added
Olds et al. (2002)	Mother–infant dyads (low income)	Nurse Family Partnership	Yes Higher EA sensitivity at 6 months in the nurse visited group as compared to control group
Naber et al. (2010)	Father–child dyads (low risk)	Nasal oxytocin administration	Significantly higher non-hostility and structuring in the intervention as compared to control conditions
Naber et al. (2013)	Father–child dyads (children with Autism Spectrum Disorder)	Nasal oxytocin administration	Improved EA in fathers
Schneider et al. (2013)	Elementary age children with established disabilities and/or risk conditions	Animal-assisted therapy (dog, dog owner, and school professional in team)	Improved EA of child toward the dog and toward the adult professionals over time
Thomas and Zimmer-Gembeck (2011)	Families at risk for child abuse	Parent Child Interaction Therapy	EA sensitivity improved in the intervention group
Murray-Kolb and Beard (2009)	South African families	Iron supplementation	EA (sensitivity and child responsiveness) improved in the intervention group as compared to control (placebo) group

experiences and children's adjustment. Also on the topic of adoption, van den Dries et al. (2012) recruited children adopted from China into Dutch homes, and examined attachment (including disorganized attachment), indiscriminate friendliness, and two aspects of EA (maternal sensitivity and child responsiveness). The investigators found that the EA dimension child responsiveness significantly improved over time.

A small number of studies investigate the EA interventions, specifically designed to alter EA and attachment. One study with adoptive families was conducted through distance technology (Baker, Biringen, Schneider, & Meyer-Parsons, in press). This EA parent intervention involves 4–6 sessions, with each session lasting approximately 2 h. The modules include learning EA language, learning about attachment, delving into one's perceptions and representations (about the family of origin as well as perceptions of the child), and video-based interactive guidance using EA as a language; all sessions are conducted through Skype. The EA Scales, the EA2 Clinical Screener, and the EA Self Report each indicated change and improvement. With a separate sample, but using the same program, Biringen et al. (2010) reported the results of the EA intervention with parents, conducted in vivo. The authors reported significant enhancements of EA (specifically, adult structuring, child responsiveness, and child involvement) as well as indicators of stress (using the Parenting Stress Index) from pre-test to post-test (which were six seeks apart). A third EA intervention involved child care professionals and the infants/toddlers in their care. Biringen et al. (2012) reported that caregiver structuring, child responsiveness, and child involvement were significantly improved. A very brief attachment-based intervention was used for adolescent mothers, and that also altered EA in the intervention group, as compared to the control group (Nicolson, Judd, Thomson-Salo, & Mitchell, 2013).

Similarly, EA was found to improve as related to the implementation of the Nurse Family Partnership intervention which targets first-time, very low-income mothers (Olds et al., 2002) using a nurse home-visiting model of service provision. This well-known model focuses on the health-relevant behaviors of the expectant mother, but also does have an attachment-based component. The authors reported higher EA sensitivity at infant age 6 months in the nurse-visited group, as compared to mother–child dyads in the control group. In another study using a double-blind, within-subject design, EA was investigated in the context of (nasal) oxytocin administration to a normative or low-risk group of fathers of toddlers (meant to enhance their nurturing behaviors). Findings indicated significantly higher non-hostility and structuring in these fathers when given the oxytocin (intervention condition), as compared to the control condition, which occurred a week-later when the fathers did not receive any such administration (Naber, van Ijzendoorn, Deschamps, van Engeland, & Bakermans-Kranenburg, 2010). In a more recent development, the same team published a paper on the results with fathers of children with Autism Spectrum Disorder (ASD), and found that the oxytocin administration improved the EA of these fathers as well, including sensitivity, structuring, and non-hostility (Naber, Poslawsky, van Ijzendoorn, van Engeland, & Bakermans-Kranenburg, 2013).

Schneider et al. (2013) applied the system in the context of animal-assisted therapy within human–animal teams (school professional, dog, and dog owner, using a standardized protocol), in elementary schools, with reliable assessment of the child's relationship within the human–animal team. The developed measure was referred to as child–dog dyadic EA. Interestingly, this dyadic EA showed steady improvement over time, such that there was a significant change from the beginning to the end of the semester.

In a recent randomized control trial of Parent Child Interaction Therapy (PCIT), an empirically validated program for parenting skills (Eyberg, 1988; Hembree-Kigin & McNeil, 1995), with a very high-risk group of abusive families in Australia (Thomas & Zimmer-Gembeck, 2011), the investigators included standard measures of child symptoms, parenting stress, and observed discrete parenting behaviors (e.g., frequency of parent verbalizations and counts of praise, questions, commands) as well as rating of global maternal sensitivity, using the EA Scales (Biringen et al., 1998). They found that the parents showed *significant* improvements (mean values) in both discrete parenting behaviors and EA sensitivity from pre-test to post-test. (Assessments occurred prior to treatment, at 12 weeks, at the end of treatment, and then one month after the last session; the length of treatment varied based on family needs, as is typical with the PCIT protocol.) However, a separate look at the data indicated an important distinction between discrete behavior codings and EA: well over 68% of parents showed improvements in discrete behaviors, while only 5% showed improvements in EA sensitivity, likely

suggesting the challenge of changing a mother's "affective procedures" (Emde, 1980) and, hence EA sensitivity. Findings suggest that PCIT (and potentially other behaviorally-based programs designed to decrease parent–child coercive cycles) may need to be augmented with emotional procedures (Emde, 1980). We currently are doing this in a randomized control trial in which Early Head Start (EHS) families with children at approximately 10 months of age are randomly assigned to receive EA parenting intervention while others receive normal EHS services. At age two years, all parents receive PCIT.

In an interdisciplinary project examining the effect of nutritional supplementation on different aspects of child functioning as well as mother–child interactions, Murray-Kolb and Beard (2009) compared iron supplementation group versus placebo group among poor, iron deficient women in a South African settlement. They found that both maternal sensitivity and child responsiveness significantly improved for the iron supplemented group as compared to the placebo group. Although clearly not a psychosocial intervention, this project underscores the importance of behavior–body connection, and that nutrition is connected with emotional health. We are not aware of any other interdisciplinary perspectives on how changes engendered in nutrition, health, or exercise might affect emotional interactions.

In summary, these studies suggest that the EA Scales demonstrate good inter-rater reliability and sensitivity to change. However, very few studies actually examine test–retest reliability of the measure, assuming that there is stability in just one assessment. Similarly, very few studies have examined stability of EA longitudinally. Further, the published evidence on the middle childhood/youth is limited to one laboratory, as noted above.

Basic research using the EA Scales

In addition to the growing use of the EA Scales to evaluate prevention and intervention science studies, as noted above, there is a much larger body of basic research utilizing the system. Researchers in North America, South America, Europe, Australia, and many non-Western countries have studied the correlates, predictors, as well as sequelae of both parental and child EA. We will review this research within the context of several organizing principles. The first organizational framework is methodological and addresses when and with whom the EA Scales may appropriately be used, as well as the method of observation. We review evidence that suggests: (a) the EA Scales can be applied in multiple observational contexts, conducted via video or directly; (b) EA is a construct that spans developmental phases (the EA Scales were designed to be appropriately utilized across a range of child ages); (c) both the EA construct and the EA Scales are applicable to children's relationships with important caregivers in their lives (as such, they apply to mothers and fathers, as well as child care providers) with suggestions to further understand relationship specificity. We review investigations linking EA with children's developmental functioning in low-risk contexts, segueing to a focus on attachment. The discussion of attachment is then extended from children's attachment behavioral organization to include caregiver representations of attachment and related constructs. Following this presentation of the literature on EA and attachment, we turn to consideration of the literature on emotional availability among dyads at high risk for problems in development due to psychosocial concerns of the caregiver or family, or biological risk status of the child. Finally, we review the use of the EA Scales in studies of children with clinical/medical conditions and the clinically relevant applications of the EA construct and scales.

Issues of observational context in EA assessment

EA has been measured in a variety of settings, including separation–reunion situations (Easterbrooks et al., 2012), other stress contexts such as the still-face procedure (Kogan & Carter, 1996), and structured and semi-structured play situations (Biringen, Damon, et al., 2005; Biringen, Fidler, et al., 2005; Biringen, Skillern, et al., 2005; Dolev, Oppenheim', Koren-Karie, & Yirmiya, 2009), as well as structured child-directed or mother-directed play (Timmer, Thompson, Culver, Urquiza, & Altenhofen, 2012). All of these observational contexts have yielded adequate inter-rater reliability and meaningful findings, providing further support for the idea that EA can be assessed both reliably and validly using a variety of contexts. If the research or clinical question concerns links between emotional availability and emotion regulation

or disorganized attachment, a stressful context such as a separation–reunion would be most revealing (see Biringen & Easterbrooks, 2012 for further discussion of this issue). If the question concerns the dyad's capacity for peak positive experiences, it makes sense to study interactions during free play or with materials known to be pleasurable to most mother–child dyads (e.g., blowing bubbles for young children). Regardless of the context, however, 15–20 min (at a minimum) is recommended in order to obtain a valid and reliable behavior sample. Thus, EA may be used in a broad range of contexts when the goal is to assess global affective quality, but when the goal is more specific, the context should match the goal. For example, if question involves treatment effects in a sample of children with conduct disorder, then one reasonable context for assessing EA is in a structured teaching task or mother-directed play. The overall interpretation is that both the construct and the measurement of EA via the EA Scales are broadly applicable across a range of conceptual questions and measurement contexts. What is important is selecting the context (and perhaps the length of time) to match the research question and sample characteristics.

Issues of filmed versus direct observations

The scales typically are scored after viewing a filmed session between the adult and child and the assessment can occur in a broad range of contexts – stressful or non-stressful. Filming a session allows for a more precise look at inter-rater reliability and coding of longitudinal data. In at least one study, direct (live) observations have been used successfully (McCarthy et al., 2003), however. The potential of such direct, rather than filmed assessment may lead to even greater use in applied settings, facilitating translation from science to service settings and with populations who are generally cautious about being filmed (e.g., divorcing/divorced couples where child custody is at stake, foster or grandparent families where the family raising the child does not have the permission of the biological parent to record the session on film). We have every reason to believe that direct, non-videotaped observations are meaningful, provided training and reliability have been achieved.

Developmental applicability of the EA Scales

The EA Scales have been developed to be applicable from infancy to adolescence. There is some preliminary work with very young infants 2–10 weeks of age (Neu & Biringen, personal communication, 2013), but most of the published work begins with infant age three months (Vliegen, Luyten, & Biringen, 2009; Vliegen et al., 2005; Zimmerman & Fassler, 2003; Zimmerman & McDonald, 1995) and 4 months (Kaplan, Evans, & Monk, 2008; Kogan & Carter, 1996; Vliegen et al., 2009). Most of the early research on EA was conducted on infants and toddlers between 9 months and 3 years (e.g., Biringen, Emde, Campos, & Appelbaum, 1995; Biringen, Robinson, & Emde, 1994; Biringen et al., 1999; Robinson & Biringen, 1995; Robinson & Little, 1994; Robinson, Little, & Biringen, 1993), and this emphasis on the early years has continued (e.g., de Falco, Venuti, Esposito, & Bornstein, 2009). With the exception of a small collection of studies, some in the US (Edelstein et al., 2004; Howes & Hong, 2008; Howes & Obregon, 2009; Lawler, 2008), others in Israel (e.g., Dolev et al., 2009), Australia (e.g., Lok & McMahon, 2006), and Germany (Lemsche, 2003), scant research has looked at children at school-age or beyond. In terms of middle childhood, the only published accounts of EA have been conducted by Easterbrooks and colleagues (Easterbrooks, Biesecker, & Lyons-Ruth, 2000; Easterbrooks et al., 2012). Only one study has included children into the preteen years (14 years) (Biringen et al., 2010), although the system is theoretically applicable across a wide developmental age span.

Conceptually, we believe emotional availability can be applicable for dyads when children range in age from early infancy into adolescence. However, the empirical research on the very early months and adolescence is very limited. Work on the earliest months would inform us about whether the system can reliably capture both sides of the relationship when the infant is providing more subtle cues and the burden of interactional responsibility rests with the caregiver. Indeed some have challenged whether qualities such as child involvement should even be measured during the early months of life (Kogan & Carter, 1996). However, newborns are capable of interacting with caregivers through imitation, gazing into eyes, and even disengaging from caregivers when overstimulated. Imitating a mother

thrusting her tongue out is a classic example of early mother–infant interaction. Similarly, beginning research on adolescence would provide information on a period where "the child" is becoming increasingly independent and private in behavior and thought, and may seem emotionally unavailable, at least on occasion.

EA and relationship specificity

Surprisingly, the major tenet of emotional availability—that emotional availability is relationship specific—has not been widely tested. In an early study, EA was found to characterize specific relationships, rather than individuals since a mother observed with two different children (twins) was found to show qualitatively different emotional availability with each child (Robinson & Little, 1994). Using a case-study approach, Lam and Kitamura (2010) also found differences in a mother's behavior toward her twins, one being hearing impaired and the other with normal hearing, with emotional availability higher toward her child without hearing loss. These studies are interesting in terms of the important empirical question of whether emotional availability is a trait versus relational construct, and need further follow through. Important questions to ask include the following: What is the limit of a caregiver's dyadic emotional availability? Can a caregiver who is highly emotionally available with one child be emotionally unavailable with another child? If there is little range in a caregiver's emotional availability across relationships with different children, then is emotional availability actually an individual characteristic rather than a dyadic one?

EA and children's developmental functioning

Several studies have examined the question of links between emotional availability and diverse aspects of infant and toddler development, including emotional regulation (e.g., infant pain response), infant sleep state regulation, infant visual self-recognition, toddler social behaviors (e.g., obedience), and toddler language development. This section focuses generally on low-risk, community samples.

Emotion regulation

A number of studies have examined the relation between EA and infant emotion regulation. In a series of studies in Canada, Pillai Riddell and colleagues investigated the context of infant immunizations in a pediatric clinic. Din et al. (2009) explored the relation between infant pain expressions and EA during inoculations, finding that maternal non-intrusiveness was related to lower infant pain immediately and one min following the inoculation, and in addition, maternal sensitivity and overall emotional availability composite were linked with lower infant pain expressions during inoculation one min after the needle. However, Racine, Pillai Riddell, Flora, Garfield, and Greenberg (2012) studied the relation between maternal verbal reassurance and infant pain during inoculations during the first year of life using a large sample of some 600 mothers and infants: EA (here, the scales were summed to create an overall EA score) was *not* found to be a significant predictor at any time point in this exploration, except that there was a relation between EA and maternal verbal reassurance at 12 months of age, and *only* at 2 min postneedle, suggesting that a small amount of reassurance right after the needle (rather than a long-drawn out process) is what is most effective. An additional examination with some 700 mothers and infants indicated that the relation between maternal sensitivity and infant pain is consistently seen only at the 12 month immunization, suggesting the importance of caregiving behaviors at a time when the attachment bond is most clearly assessed (Pillai Riddell et al., 2011). The findings from this laboratory have numerous implications for clinicians who deal with pain management in the primary care context.

In a U.S. study meant to examine emotion reactivity in infants, Little and Carter (2005) presented an emotional challenge to a low SES group of (mostly) African–American mother–infant dyads, and found that dyads with higher EA (both mother and infant EA) demonstrated greater emotional control during a challenge situation. Specifically, greater maternal hostility was significantly related to difficulties in infant emotion regulation in the challenge context and marginally associated with difficulty

in emotion regulation in the postchallenge contexts, even after covarying the impact of infant emotional reactivity. In a separate study, relations were found between EA (sum of the dimensions, and called 'dyadic emotional interaction') and emotion regulation (Martins et al., 2012). It could be easier to be sensitive, appropriately structuring, non-intrusive, and non-hostile with a child who is able to emotionally regulate himself/herself, and hence evoke less oppositional or more rewarding styles of relating in the context of the caregiver–child relationship.

Developmentally, links between EA and child functioning are not limited to the infant and toddler years. In an interesting study looking at preschoolers' HPA axis reactivity (evidenced by rises in the stress hormone cortisol in the laboratory to social and non-social threat contexts), investigators found that sensitive parenting helped to regulate the stress responses of highly inhibited children to social (but not non-social) threat (Kertes et al., 2009).

Sleep state regulation

In contrast to the emotion regulation evidenced under discrete immunization contexts in a primary care setting or reactions to a discrete challenge or stressful situation, the context of infant sleep is an ongoing developmental issue in the early mother–infant relationship. In one study in the U.S., mother–child EA (composite maternal EA score was calculated by converting maternal EA scores to *z*-scores and summing them) in the nursery at bedtime was found to be associated with infants' (ages 1 month to 24 months) optimal sleep patterns (Teti, Kim, Mayer, & Countermine, 2010). In contrast, in an Israeli sample, a study found that EA maternal sensitivity during the day (in a brief free play context during the day) was unrelated to optimal sleep patterns for 12 month olds, but the child's side of emotional availability was predictive (Scher, 2001). For more responsive and involved children during the daytime play, there was a higher frequency of night waking, and hence, more fragmented sleep, compared to those who showed less emotional eagerness in play. At present, it is unclear whether these two studies are at odds, given the contexts of observation of EA (daytime versus nighttime) and ages of infants (12 month olds only versus the inclusion of younger infants). Given that the Teti studies are ongoing, they may shed light on this important aspect of EA and infant biobehavioral regulation, as well as whether it is easier to be emotionally available to a "good sleeper" than one who resists settling down.

Social and language development

Additional aspects of child development beyond emotion regulation (e.g., self-recognition, social engagement, and social-cognitive skills) have been studied in relation to EA. For example, in a study conducted in Israel, higher EA (specifically, child responsiveness) was associated with infants' earlier mirror self-recognition, suggestive of an emerging sense of self (Harel, Eshel, Ganor, & Scher, 2002). In addition, 7-month-old infants of more emotionally available mothers were more accurate in interpreting human actions as goal-directed than those of less emotionally available mothers, suggestive of greater social-cognitive understanding; interestingly, maternal non-hostility showed the highest intercorrelation with this index of social-cognitive development (Licata et al., 2013). Toddlers of mothers who showed higher sensitivity and structuring were more obedient with their mothers' requests (Lehman, Steier, Guidash, & Wanna, 2002), echoing Ainsworth's (Ainsworth et al., 1978) findings on child obedience and maternal sensitivity. Once again, we caution the reader that we are mindful of the transactional influences between parent and child, and that it may be easier to be emotionally connected to a more inherently responsive and obedient child.

Moreno, Klute, and Robinson (2008) conducted a longitudinal investigation of the link between parental care (maternal emotional availability used as a latent variable) at 15 months and the development of children's social engagement (latent variable comprised of child responsiveness and child involvement scales) at 2 years, and child empathy at two to four years. They used structural equation modelling to understand this transmission. Maternal EA at 15 months was predictive of child language and cognition at age 2 years (age-appropriate expressive and language skills as well as mental development). Further, child EA (which they termed 'social engagement toward the mother') at age two was

a significant predictor of child empathy toward the mother as well as child empathy toward an adult outside the relationship, at age four. They stated,

> "this is the first study. . .to show that sensitive parenting is necessary but not sufficient for the development of empathic responding. Children's cognitive and relational skills contribute substantially to the internalized 'lessons' of sensitive care as reflected in being able to express empathy toward mother and others. What we have observed is that early sensitive care contributes to children who are brighter, have better language, and have developed greater emotional availability toward mother by two years of age and that these children also tend to be able to express more positive and less negative empathic behaviors." (p. 630–631)

There also is evidence that EA predicts preschool children's internalizing and externalizing behavior problems at school, as assessed through questionnaires (Kang, 2005), further suggesting that as children engaged in higher EA in their mother–child relationships, they appear to be better adjusted than those who were engaged in lower EA mother–child relationships. In another study examining Mexican-heritage families in the US, maternal sensitivity and structuring at home when the child was three years of age predicted children's social competence, pretend play, and children's exclusion by peers during pre-kindergarten (Howes & Hong, 2008). Another investigation showed that multiple dimensions of EA measured in the pre-kindergarten year were associated with kindergarten readiness (Biringen, Skillern, Mone, & Pianta, 2005). More specifically, maternal sensitivity and structuring, as well as child responsiveness and child involvement, assessed during the spring or summer before kindergarten predicted lower levels of observed aggression and/or victimization, as well as teacher-reported internalizing and externalizing symptoms, during the transition to kindergarten and at the end of the kindergarten school year. These studies are particularly important in validating the construct of EA because they assess child outcomes outside the parent–child context and in the wider world.

In this as well as other sections, it is important to note that we are not necessarily claiming that high parent EA is causal to good child development. It may indeed be easier to experience high parent EA in the context of a child who is developing well; these EA qualities may also be both subsidiary to other environmental or genetic factors in the parent or child, or other circumstances. Given the dyadic, relational quality of EA, it is important to consider this caveat in interpretation of EA research.

In summary, the links between EA and children's early developmental functioning have been documented. However, the system can be used well into the teen years and the links between parent–teen EA and areas of teen adjustment and maladjustment (such as anxiety, depression, eating disorders, aggression/victimization) can be areas of basic inquiry. When a child (or teen) is experiencing difficulties, he or she may become emotionally unavailable toward the parent(s), and such changes in the child's side of EA may be an important clue to the child's overall adjustment and may have implications for prevention programs or intervention efforts. The same can be said if parents are experiencing difficulties, that they too can become distant in their emotional availability towards their teens. Interestingly, a recent study was published suggesting that teenagers whose mothers struggled with depression during their pregnancy were at a higher risk of developing depression. In fact, teens were 47% more likely to be depressed if their mothers were depressed during pregnancy even when mothers' depression after birth was covaried (Pearson et al., 2013). Depending on the sources of depression, would teaching parents EA during their pregnancy reduce their own depression, thereby reducing their child's risk of developing depression?

EA linked with attachment

The EA Scales were developed, in part, to capture global relational quality of affective relationships and in part to describe attachments. The measurement system was initially developed by poring over countless videotaped episodes of caregiver–child interaction and then examining the emotional availability against the attachment classifications assessed in the Strange Situation Procedure. Interestingly, they have been consistently predictive of attachment categories, regardless of context of EA assessment (Easterbrooks & Biringen, 2000). When measured in the context of separation–reunion, in contrast to free play (van den Dries et al., 2012), the scales also have been predictive of attachment

disorganization, as illustrated by Easterbrooks et al. (2012). Further, these associations between EA and attachment are demonstrated not only in children's attachment classifications, but also in relation to caregivers' own representations of attachment, validating that these are two related constructs. A large body of data provides empirical support for significant links between EA and attachment, at different age periods; further, these links between EA and attachment have been documented in samples that vary in country of origin, psychosocial risk status, and different age periods, as will be described below.

Children who are typically-developing, with their primary caregivers

As would be expected, sensitivity seems to be a key facet of caregiver EA, particularly as it is related to children's attachment classifications. For example, in an Israeli sample, children with sensitive mothers are more likely to be securely attached; children of less sensitive mothers are often insecurely attached (Aviezer, 2008; Aviezer, Sagi, Joels, & Ziv, 1999; Aviezer, Sagi-Schwartz, & Koren-Karie, 2003; Sagi, Koren-Karie, Gini, Ziv, & Joels, 2002; Ziv et al., 2000). The same relations hold for US samples for infancy/early childhood (Biringen, Damon, et al., 2005; Biringen, Fidler, et al., 2005; Biringen, Skillern, et al., 2005; Carter, Garrity-Rokous, Chazan-Cohen, Little, & Briggs-Gowan, 2001) as well as older age groups (Easterbrooks et al., 2000). The linkage between sensitivity (using varied sensitivity measures, including global scales as well as discrete counts) and attachment is often in the moderate range, suggesting a "transmission gap" (van IJzendoorn, 1995). One reason for the transmission gap may be variations in length of observation. Biringen, Damon, et al. (2005) found that with each additional 15-min episode of EA that was scored (up to 2 h of observation) the association between EA and attachment increased. Although we, too, believe that contextual and other factors besides sensitivity are important in predicting attachment, we maintain that sensitivity-attachment linkages may be enhanced if researchers would use longer observation episodes to assess EA.

Although sensitivity is a component of the EA, the construct of EA was conceptualized to encompass more than sensitivity, and the empirical research underscores the importance of other EA dimensions in addition to sensitivity. In the Ziv et al. (2000) study in Israel, for example, attachment security was related to many of the EA dimensions (the three adult dimensions of sensitivity, structuring, non-intrusiveness, as well as the two child dimensions of responsiveness and involvement), except maternal non-hostility. Further, substance-abusing mothers were more likely to be intrusive than non-abusing mothers and it was intrusiveness which was predictive of disorganized attachment in this population (Swanson, Beckwith, & Howard, 2000). Additional papers report the importance of qualities such as adult structuring (Biringen et al., 2012) or maternal non-hostility (Stack et al., 2012) and even downplay the significance of adult sensitivity (Biringen et al., 2012).

With respect to the prediction of disorganized attachment, the story is more complicated and more contextual. Swanson et al. (2000) found a negative link between maternal non-intrusiveness and disorganized attachment, using the Strange Situation procedure, in a brief (10 min) free play episode. While others have not found a link between brief, free play EA and disorganized attachment and have suggested that measures of interactional quality, such as EA, using a separation–reunion paradigm, Easterbrooks and colleagues (Easterbrooks et al., 2012) have found a link between EA and disorganized attachment among children in middle childhood. Drawing on the extant linkages and contextual variations on this topic, we speculate that such transmission gaps may be methodological artifacts of context *and* duration of observation, which future research could address very directly, similar to the effect of duration of observation, which already has been addressed, at least to some extent (Biringen, Damon, et al., 2005). We encourage exploration of the meaning of emotional availability and the meanings of secure, insecure/avoidant, insecure/resistant, and disorganized attachments–as constructs. Further, we invite inquiry about the settings and conditions under which the measurement of emotional availability may be related to the assessment of attachment (e.g., under stress or naturalistic conditions that provide a range of inter-

actional contexts), as well as the settings and conditions under which we would not expect there to be linkages (e.g., under brief and non-stressful conditions).

Children who are typically-developing, in the context of child care or other multiple caregiving arrangements

The context of multiple caregivers is often synonymous with the child care context. Looking at the child's attachment to a professional caregiver, EA has been predictive of this relationship, using the Attachment Q-Sort (Waters & Deane, 1985) among children in family child care homes (Shivers, 2006, 2008) as well as in the context of center-based child care (Biringen et al., 2008, 2012). Numerous dimensions of EA (particularly the structuring and the child dimensions, and interestingly, not sensitivity) have been predictive of attachment with child care providers (Biringen et al., 2012), suggesting the appropriateness of dyadic EA evaluation in multiple caregiver and/or multiple children contexts.

A large-scale Israeli study provided some unexpected insights about the impact of relationships upon relationships (i.e., professional caregiver–child to primary caregiver–child relationships). Aviezer et al. (2003) examined EA as well as attachment (as measured by the Strange Situation) among children who spent the day with their mother, with a relative, with a nanny, or in a group day care setting. Findings indicated that children in the group day care setting were more likely to be insecurely attached to their mothers than were children who were cared for within more individualized settings with mother, family member, and/or nanny. Further, in the group context, where children stayed overnight, there were as many infants of sensitive mothers (measured using the EA Scales) who were insecurely attached to them as there were infants of insensitive mothers who were insecurely attached (Aviezer et al., 2003; Sagi et al., 2002). Further, for children in group care (but where the children slept in their own homes), the expected positive association between maternal sensitivity (as measured by the EA Scales) and attachment was found; this was not the case for those in group care who spent the night in a dormitory, indicating that the sleep and night time are particularly important contexts for the development of feelings of safety, trust, and security in the context of relationships, and hence a context that can influence the effect of relationships on relationships.

The above studies have provided important information about the potential applicability of the EA Scales in child care contexts both in the US and internationally, but we know of no published work on the use of the tool in the context of the family system. Note that Lovas (2002, 2005) studied EA in both mother–child and father–child interactions, but these interactions were observed sequentially, with the order counterbalanced. Further, we do not know whether in some cultures a dyadic look at EA may even be inappropriate. For example, in cultures where children are truly raised by multiple adults, a dyadic look at relationships may not be as ecologically valid as a "community" perspective on emotional availability. What is the "emotional temperature", if you will, of this household, or the extended family? Alternatively, can the dyadic perspective still be a valuable tool? To advance theory building, use of the EA Scales to examine questions about the larger concept of emotional availability may be timely, beyond use of the tool as a convenient measure of caregiver–child interactions.

EA and attachment in children with disabilities

In a study looking at attachment and EA in children with disabilities (21 toddlers with Autism Spectrum Disorder (ASD), 10 toddlers with mental retardation, 9 toddlers with language delays, and 15 typically-developing toddlers) using maternal sensitivity and child responsiveness, van IJzendoorn et al. (2007) found comparable levels of sensitivity across groups. They also found no relation between maternal sensitivity and children's security of attachment (using the Strange Situation Procedure), and suggested that biological constraints can alter the expected intergenerational transmission of attachment. Mothers' difficulty in interpreting the cues of the children may impair the connection between sensitive parenting and a secure attachment. However, given the small sample size of this study and the brief context of free play, Koren-Karie, Oppenheim, Dolev, and Yirmiya (2009) conducted a second examination of the link between mother–child EA (also using maternal sensitivity and child

responsiveness scales of the system) and EA for children with ASD. This study utilized a larger sample size of 45 children and mothers, and employed three contexts instead of one (and hence, longer duration of observation, yielding a more reliable estimate of the construct); children's severity of diagnosis and their level of mental development were also taken into account. Their findings are extremely enlightening and, in many ways, optimistic with respect to ASD: Mothers of securely attached children were more sensitive than mothers of insecurely attached children, even when controlling for children's severity of diagnosis, mental development, and child responsiveness. The findings indicate that the expectable relation between maternal sensitivity and attachment security also hold for children with ASD. They were, however, not able to find significant differences in the sensitivity of mothers in the organized (insecure/avoidant and insecure/resistant) versus the disorganized attachment groups, and speculated themselves about whether the lack of measurement of frightening behavior may have been overlooked. Despite this important clarification about the transmission of attachment, Koren-Karie et al. (2009) may have included the non-hostility dimension, which is designed to detect frightening behavior, but contexts of usual play may not be as sensitive to this phenomenon as stressful contexts that elicit frustration or hostility in the parent. We encourage further work with the different dimensions of the EA system using contexts that might elicit these different components (in contrast to the high multicollinearity seen when all six dimensions are coded in the same context).

In a recent study entitled "looking beyond maternal sensitivity", John, Morris, and Halliburton (2012) examined the relation of EA with attachment security in an urban, Indian sample of children with intellectual disabilities (including children with cerebral palsy, children with autism, and children with an unknown etiology). Child emotional availability and maternal emotional availability were only correlated at a moderate level, and child emotional availability mediated the link between maternal emotional availability and child adaptive functioning (as rated by teachers using the Vineland Adaptive Behavior Scales-Teacher Survey, 2nd edition (Vineland II; Sparrow, Cicchetti, & Balla, 2005). Further, children's emotional availability emerged as a mechanism connecting children's adaptive functioning with attachment security (measured with the mother-reported Attachment Q-Sort, Waters & Deane, 1985), suggesting clear *child* effects in the prediction of attachment for children with disabilities. Although this study is important in adding to the growing knowledge base on EA in relation to attachment security, it is even more important because it focuses on children with disabilities and uncovers the importance of the child's side of the relationship. Note that maternal emotional availability (which includes maternal sensitivity of course) predicted attachment security, as reported by the mother. However, the link between maternal emotional availability and mother-reported attachment became non-significant upon the addition of child emotional availability in the regression model. This study is among the few published studies on EA in non-Western samples.

Summary and reflections about attachment

Including other parent–child coding systems in the same study may be helpful in furthering our understanding of the emotional availability construct. Mary Ainsworth (Ainsworth & Marvin, 1995) highlighted the distinction between warmth and sensitivity, when interviewed by Robert Marvin, and one study (Teti, personal communication, 2012) found that maternal warmth (measured by a separate scale) was not predictive of attachment security (Attachment Q-Sort, Waters & Deane, 1985), but that EA sensitivity (using the EA Scales) was, suggesting that warmth can only go so far—sensitivity to the child's behaviors is what predicts attachment. Micro-analytic codings in conjunction with the global approach may provide a great deal of information (Robinson et al., 1993). Important theoretical considerations include that the EA Scales are a measure of global emotional interaction, rather than solely an avenue to viewing one aspect of emotional relationships (attachment that is typically rooted in the fear/wariness system and is critical for protection and survival). Although the latter is very important, additional aspects of relationships also are important. A baby with an insecure/resistant attachment who also has many positive emotional interactions with one or both parents (in low stress, play contexts, for example) may have a very different developmental trajectory than one who is in-

volved in few such experiences. Use of the EA Scales in conjunction with an attachment measure may create a concept of parent–child relationships that is more broad than one based solely on attachment or emotional interaction.

EA and caregiver representations of attachment

Maternal representations of attachment are strongly linked with infant attachment security (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003), and thus there is the expectation that EA and adult attachment representations would be linked.

This connection between maternal representations (of attachment history and of the child) and EA (either or both maternal or child behavior) has been demonstrated using the EA Scales. This conclusion is drawn from US samples (Biringen, Brown, et al., 2000; Biringen, Matheny, et al., 2000), Italian samples (Coppola, Vaughn, Cassibba, & Costantini, 2006), as well as Canadian samples (Oyen, Landy, & Hilburn-Cobb, 2000; Rethazi, 1999). Thus, the Adult Attachment Interview (AAI) not only is predictive of child attachment classifications (e.g., Main, Kaplan, & Cassidy, 1985), but also, as would be expected, the dimensions of EA. However, such intergenerational transmission is not always the case: where the infant has a medical condition, the expected relation between maternal representations and attachment may not hold, as suggested by the findings of Cassibba, van Ijsendoorn, and Coppola (2012). Further, where the mother perceived the birth experience (of her very low birthweight infant) as particularly traumatic (per the AAI), interactions were emotionally unavailable as much as 14 months after the preterm birth, as compared to those who did not experience the birth as traumatic in this sample (Wünsche & Brisch, 2010). More research not only on children with disabilities but children with medical ailments, or families with medical ailments, should be conducted to understand how emotional availability is impacted.

Mother–child EA and attachment styles in couple romantic relationships

We would expect a relation between parent–child EA and the couple's romantic relationship – either because a harmonious marriage or a couple relationship would support a similarly synchronous parent–child relationship or because of spillover from a rewarding parent–child relationship to other aspects of the family system. Using a self-report measure of attachment styles in close adult–adult relationships, Edelstein et al. (2004) found that mothers scoring high in avoidance with respect to adult intimate relationships were more likely to show lower EA (sum of the maternal EA dimensions) when their 3–7-year-olds were experiencing distress during inoculation. This pattern was reversed in mothers with low avoidance scores. The connection between self-reported attachment styles in the couple relationship and EA in the parent–child relationship is consistent with a family systems perspective and certainly suggests an interesting avenue for future research with couples. Couple version of the EA (observational and self-report) have been developed which may be used to further study this interesting "ripple effect" of relationships on relationships.

The studies noted above suggest the presence of coherent and theoretically predictable relations between maternal representations and emotional availability. Although these sorts of findings indicate merely a linkage between relationship representations and observed emotional availability, they do raise the intervention question of whether enhancements of emotional availability in one relationship can impact other relationships. Such research can provide important insights into whether and in what way interventions may work to build or strengthen relational capacity in the family.

EA and mind mindedness and other cognitive representations

Mind mindedness (Meins, Fernyhough, Arnott, Leekam, & Turner, 2011) is a construct reflecting a mother's representation of her child as having an autonomous sense of self. Although it is not an assessment of caregivers' attachment representations, the construct of mind mindedness (MM) is closely aligned with attachment representations. In a series of studies on MM and EA, conducted in Aus-

tralia, mothers who were chronically depressed showed some cognitive distortions, and lower maternal EA sensitivity toward their 4-year-old children as compared to non-depressed mothers (Lok & McMahon, 2006; Trapolini, Ungerer, & McMahon, 2008). Such cognitive distortions included the inability to take the child's perspective. For those depressed mothers who could see the child's perspective (were mind minded), maternal sensitivity was less impaired, however (Trapolini et al., 2008), suggesting the importance of intervention efforts aimed at not only maternal sensitivity but also coherent reflectiveness about the child. Indeed, such findings support the increasing look at reflective capacity as an important parenting quality (Fonagy, Steele, Moran, Steele, & Higgit, 1991). In contrast to the above, Gocek, Cohen, and Greenbaum (2007) did not find a relation between EA and the mother's mental state terms (including cognitive terms, such as think, know, remember, guess; desire terms such as want, hope, wish; and feeling terms such as angry, sad, mad). There was no significant relation between usage of such mental state terms and mother–child EA, suggesting that there may be limitations on the use of language or reflective capacities and a construct such as EA, which is mostly about emotional presence "in the body", a thought that runs counter to the movement on the importance of reflective functioning (Fonagy et al., 1991). In other words, could a parent be high in EA (instinctually) but not be particularly reflective, and alternatively could someone be very reflective, but not very present emotionally?

EA and at-risk dyads

Although comparatively more EA studies have focused on normative or low-risk samples (as shown in Table 1), there are nonetheless at least 30 peer-reviewed publications that have included various samples considered at psychosocial risk for problematic caregiver–child relationships, parenting behavior, and child development. Many of these studies also have included normative samples as comparison. The literature on at-risk groups and EA focuses on risks related to maternal depression, substance abuse, and maternal childhood history of maltreatment.

Maternal psychological functioning

Empirical studies that include at-risk samples generally confirm the theoretically-expected relations between EA and risk status. That is, in samples focusing on risk for developmental problems due to various mental health or psychological issues (e.g., depression, substance abuse, etc.) comparatively lower EA is demonstrated in the high risk group. For example, lower mother–child EA is found in circumstances where the mother is depressed (Easterbrooks et al., 2000; Lok & McMahon, 2006; Trapolini et al., 2008; Vliegen et al., 2005; Vliegen, 2009), or has a comorbid condition such as depression and another diagnosis (Carter et al., 2001), anxious (McCarthy et al., 2003; Zelkowitz, Papageorgiou, Bardin, & Wang, 2009), traumatized by war (Van Ee, Kleber, & Mooren, 2012), or with a history of maltreatment (Möehler, Biringen, & Poustka, 2007; Timmer et al., 2012), or substance abusing (Flykt et al., 2012; Goldman-Fraser, Harris-Britt, Thakkallapalli, Kurtz-Costes, & Martin, 2010; Salo et al., 2009, 2010; Swanson et al., 2000).

With respect to maternal depression, however, some studies do indicate that there are no significant differences in EA in children ages 2–7 years (e.g., Timmer et al., 2011) who participated in Parent Child Interaction Therapy (PCIT) with their mothers. Although one may easily jump to the conclusion that many depressed mothers are able to buffer their children from the effects of depression, in fact the authors used only the child EA scales. This decision was consistent with their focus in the project of improving child behavior, although one does wonder about the maternal side of EA in an important study like this. Although the child's side is perhaps the more powerful element in the dyadic system, nonetheless child behavior may have changed because of the additional attention afforded by the 20 PCIT sessions, or at least, this remains an alternative explanation. However, Fonseca, Silva, and Otta (2010) found no significant differences in postpartum depressed mothers versus non-depressed mothers, although there was a relation between EA maternal sensitivity and aspects of social support, education, and attachment styles. There are a number of null findings with respect to EA in depressed and non-depressed mothers in the field about which the first author is aware (Biringen, personal communication

2013), but that are not published, due to the common "file-drawer problem", the bias introduced into the scientific literature by selective publications of only significant findings (Rosenthal, 1979). For example, one very interesting unpublished dissertation investigating maternal borderline personality disorder versus no diagnosis also did not find differences in EA, although borderline personality features of affective instability and negative relationships were associated with several EA dimensions on both the maternal (sensitivity) and child sides (responsiveness and involvement) (Trupe, 2010). Collectively, it may be important for studies examining EA in relation to any diagnoses to include not only the category but also dimensional features that can be palpable regardless of the diagnosis and that form the basis of behavior.

Since most studies have not used the entire complement of the EA Scales it is difficult to determine whether there is greater discriminant validity with particular scales. For example, van Doesum, Hosman, Riksen-Walraven, and Hoefnagels (2007) used the sensitivity dimension but not others, and Swanson et al. (2000) used only non-intrusiveness); hence, it is difficult to understand whether some parent–child characteristics are more affected by maternal risk, and/or specific types of maternal risk.

Surprisingly, EA and DSM diagnoses have not been examined, despite the wealth of such information in many clinical practice settings; this presents an opportunity ripe for research-practice collaborations! For example, what does the EA of parents with narcissistic personality disorders (or borderline personality disorders, or other) look like? Such questions have a great deal of practical value, given that custody evaluations routinely include potential parental personality and diagnostic testing, with the need to make recommendations about parenting quality. The research community can help provide this type of information to the practice community, who can inform the research community of their needs and usage of such information.

Family social risk

Two sociodemographic factors have received some attention in relation to EA – socioeconomic status (SES) and divorce. Parents with low economic resources have been found to be less sensitive than those with greater economic resources in the U.S. (McCarthy et al., 2003), and lower SES groups have been found to be more hostile than higher SES groups in the U.S. (Chaudhuri, Easterbrooks, & Davis, 2008; Little & Carter, 2005) and in Israel (Ziv et al., 2000). Although SES is a risk factor for lower EA, it is also noteworthy that in Israel, lower SES mothers of securely attached babies showed a significantly higher score for sensitivity than the higher SES mothers of insecurely attached babies (Ziv et al., 2000), suggesting that the link with attachment is based on behavior rather than on social advantage. This suggests that, rather than assume that dyads with low economic resources will show low EA, there is a need to "unpack" this variable to understand more about the circumstances that might promote low EA in these families.

A small amount of research on divorcing families suggests similar findings. Lower levels of EA have been documented in divorcing (during the active divorce process) mothers in interaction with their young children, as compared to those from intact families (Sutherland, Altenhofen, & Biringen, 2012). However, within this divorcing group, EA child involvement proved to be significantly related to the mother-reported Attachment Q-Sort (AQS; Waters & Deane, 1985) Security scores; children who involved their mothers more in interaction were more securely attached to them. These data again highlight the links between EA and attachment. Further, EA child involvement contributed to attachment outcomes above and beyond other divorce-related characteristics (e.g., age of onset of overnight stays with nonresidential parent, and parent and partner contributions to inter-parental conflict) (Altenhofen, Sutherland, & Biringe, 2010). Since attachment was not investigated in the non-divorcing group there are no comparative data in this paper.

EA in dyads where children have disabilities

In this section of the paper we review research about diverse risk conditions that may affect children and their caregivers, including Down Syndrome, Autism Spectrum Disorders, sensory impairments, as well as medical ailments, and we examine how the EA Scales may be utilized in these populations, etc. The EA Scales may be used for both typically developing children and for children

with disabilities. Directions for understanding and scoring emotional availability in such children were developed by Biringen, Fidler, Barrett, and Kubicek (2005), but there is not a separate version for children with disabilities. By and large the system is used in a very similar way for all children.

Research has indicated that among deaf and hearing-impaired children (Pipp-Siegel, 1996; Pressman, Pipp-Siegel, Yoshinaga-Itano, & Deas, 1999; Pressman, Pipp-Siegel, Yoshinaga-Itano, Kubicek, & Emde, 1998) there is a significant connection between child EA (child scores were summed to create child EA composite) and progress in linguistic development. A similar link between child EA and linguistic development was found for hearing children in a separate project (Lovas, 2002). However, maternal EA (maternal scores on only sensitivity and structuring were summed to create a mother EA composite; EA was more predictive of linguistic development for the deaf/hearing impaired group than those in the normal hearing group, suggesting that the more vulnerable children respond well to the mother's sensitive and appropriately structuring behaviors. The authors note that emotional communication is the "language of infancy" (Emde & Easterbrooks, 1985, p. 85), and that this type of communication functions alongside linguistic modes of communication and may serve a compensatory function during the toddler and preschool years in supporting language learning in circumstances where the linguistic channel may be challenged, such as when a child is deaf or hard of hearing. In this work, no significant difference was observed in the mean levels of EA between the dyads with a hearing-impaired child and the hearing control dyads, underscoring the importance of multiple communication systems.

On the other hand, a different study comparing hearing impaired dyads and hearing controls found that hearing-impaired mothers and children touched each other more often than the controls, and that a decrease in the number of touches in this group was associated with an increase in hostility, whereas the opposite was the case in the controls, suggesting the importance of touch among dyads where hearing is impaired (Pipp-Siegel, Blair, Deas, Pressman, & Yoshinaga-Itano, 1998). We wonder whether touch may be more important in cultures where physical contact (at least in the early years) is relatively more important (e.g., Japan, some African cultures, other "traditional" cultures), and encourage research on this question.

Mothers of visually impaired children also have found adaptive strategies for making themselves emotionally available to their children, such as providing more verbal information, structuring play, as well as accepting their child's initiatives, according to research with Australian mothers (Campbell, 2007; Campbell & Johnston, 2009). This work utilized a case-study approach, and beckons for further empirical investigations with larger sample size that would allow for group comparison of visually impaired versus sighted children and their mothers.

Research with children with Autism Spectrum Disorders (ASD) suggests that context is quite important for assessing EA. In a study from Israel, children with varying severities of Autism Spectrum Disorder (ASD) showed highest levels of EA (all six scales) when participating in social play, where specific instructions were given to the parents about what to do during the session, whereas the lowest EA levels were seen during free play, where no instructions were given (Dolev et al., 2009), suggesting that context and interactive structure can be quite important. In this study, children low in functioning had lower EA scores (child scales summed) and those who were higher in functioning received higher EA scores; severity of symptoms was associated with child EA as well as the maternal dimensions of structuring and non-intrusiveness (but not sensitivity and non-hostility). In a Dutch study about children diagnosed with ASD at age *four* years, maternal sensitivity at age *two* was found to be similar for dyads where the child was later diagnosed with ASD versus those where there was no such diagnosis at age four, but the children who would later be diagnosed with ASD showed less optimal involvement of their mothers (at age two), suggesting the importance of understanding a child's early signals of emotional *un*availability to the mother (van IJzendoorn et al., 2007).

Working with an Italian sample of mothers and their preschoolers with Down Syndrome, Venuti and colleagues found a significant link between EA (maternal sensitivity and structuring, child responsiveness and child involvement) and children's symbolic play in the presence of the mother, whereas there was no link for exploratory play in the presence of mother, or any type of play when the child was merely playing alone, underscoring the importance of context for this group of children with special needs (Venuti, de Falco, Giusti, & Bornstein, 2008). Both mothers and fathers exhibited similar EA levels with their children with Down Syndrome (De Falco et al., 2009), suggesting that although

fathers have, in one study, been found to show lower levels of EA than mothers (Lovas, 2002, 2005), this discrepancy may not be seen in the context of raising children with special needs (Venuti et al., 2008). Why do fathers of children with Down Syndrome exhibit higher levels of EA than fathers of children without disabilities? What is it that these fathers have learned that can be taught to other fathers?

Children with psychiatric and/or medical difficulties

An important area of study is the extent to which diagnostic categories might map onto variations in parent–child relationship quality; the EA Scales may help with such understanding. An investigation of a German sample of mothers and infants examined the link between EA (sum of all the scales) and diagnostic classifications (using the Diagnostic Classification 0–3) (Wiefel et al., 2005) in a child population. Dyads in which the child was diagnosed with a regulation disorder (involving crying and sleeping issues) showed the highest EA, whereas those where the child had a feeding disorder showed the lowest. Further, EA ratings by the research team were negatively correlated with intensity of recommended treatments (recommended by the clinical staff, who were not associated with the EA ratings) (Wiefel et al., 2005).

An Israeli team has systematically studied emotional availability in relation to feeding disorders. In comparing children with non-organic failure to thrive and a community sample of children without feeding difficulties, Atzaba-Poria et al. (2010) studied both mothers and fathers in the family, transcending the intertwinement of food with mothering. They found that both mother–child and father–child interactions were less emotionally available in the feeding disorders group as compared to the control group and that children's interactions with mothers were more optimal; this pattern of mother–child interactions being more optimal than father–child interactions was evident not only during feeding but also the play interactions (the context for fun), particularly in the area of sensitivity. But, interestingly, within the feeding disorders group, where fathers were more involved in daily basic care and activities, no differences were found in mother–child versus father–child emotional availability, suggesting that when fathers positively contribute during a challenge in the family, mothers are able to express their emotional availability more successfully.

In a separate report, Gueron-Sela, Atzaba-Poria, Meiri, and Yerushalmi (2011) reported that mothers in the feeding disorders group were more intrusive and less structuring than mothers in the control group and that the process by which this occurs may be maternal worry about underweight. That is, maternal worry mediated the link between feeding disorders and emotional unavailability. They state, "These findings highlight how mother–child relationship difficulties may be nested in child feeding problems. . ..and suggest that childhood overweight and underweight problems may be explained by similar processes" (p. 7). "Weight" may be viewed in many Western societies as an indicator of parental dedication to the child's well being and competence, with abundant surveillance in well-child clinics with the use of growth charts. Thus, societal pressures could potentially tip some parents toward over-worry about a child's welfare. Psychosocial support about weight gain may be more important for parents than has been previously realized.

Finally, an interesting study examined EA in mother–baby relationships where the baby has gastrointestinal symptoms related to a cow's milk allergy (Merras-Salmio et al., 2013). In this study using a double-blind, placebo-controlled food challenge for cow's milk, these investigators reported lower EA in those with cow's milk allergy, compared to normative data. These findings suggest appropriate psychosocial support for not only children with disabilities but also for families where the child has some sort of medical ailment.

In our view, understanding the power of emotional communications for children with disabilities or medical conditions has barely begun. Given the variability in mother–child EA for such children (Dolev et al., 2009; John et al., 2012), and one study finding that children with serious disability may be at risk for emotional unavailability in their interactions with their mothers (Wünsche & Brisch, 2010), interventions designed to improve emotional and relationship education may be an important research and intervention frontier.

Evidence-based practice or psychotherapy

We were able to locate only three published studies that examined the EA Scales in clinical settings, potentially because clinicians may not publish their observations. One such investigation used EA to evaluate Parent Child Attunement Therapy (Dombrowski, Timmer, Blacker, & Urquiza, 2005), an intervention for parents of toddlers, adapted from Parent Child Interaction Therapy (PCIT). In this single-case study (Dombrowski et al., 2005), clear improvements in maternal EA (in particular, sensitivity) were seen from pre- to post-therapy. However, the results also indicated that changes in the mother do not immediately translate into changes in the child. The investigators found that while discrete maternal behaviors, as well as maternal sensitivity, improved from pre- to post-intervention other aspects of EA did not (e.g., structuring, child responsiveness, and child involvement). Although this was a single treatment case, the study underscores an additional point – that going beyond maternal sensitivity is an important avenue for work. Including assessment of the child's side of emotional availability is critical.

Belt et al. (2012) described a case study involving the psychotherapy and evaluation of a drug-abusing mother in relationship with her infant, after the suicide of her partner (infant's father), using attachment and EA instruments, including the Strange Situation Procedure and Adult Attachment Interview (AAI; George & Main, 1985). Using the observational/behavioral attachment lens to view the infant, the attachment representation lens for the mother, and the EA lens to track dyadic emotional relationship qualities over time, the authors noted that each showed clear pre-treatment to post-test treatment improvements, with the attachment and EA perspectives complementing one another. The clinicians were able to see changes in EA during the treatment sessions, while the more structured attachment measures confirmed the ongoing emotional improvements. Another brief report on a single case was done by Biringen and Allender (2011) using the EA Scales and the AAI in the context of child welfare, with a mother in jeopardy of permanently losing custody of her child. These authors emphasized that evidence-based tools can move the psychotherapy process, to potentially reunite the family, as well as to communicate to professionals in the child welfare system the best interests of the child.

The EA system lends itself well to therapeutic use, even beyond evidence-based programming. Examining and reflecting on what takes place within the parent–child interaction, together with the parent involved, can be very supportive for the parent and stimulating for the relationship. Viewing an interaction (via video) can be revealing for an uncertain and depressive parent. For a mother who believes that her child does not care about her, to see how the child responds to her gaze and the sound of her voice can become very therapeutic. Being confronted with this kind of video material can sometimes bring a parent to talk about what he/she is really afraid of: "you would get better images with his father; the baby responds more to him", said one mother, whose child actively avoided all her initiatives. By looking at the "here and now" of a relationship in a therapeutic context, one can often find contact points for further therapeutic reflection (Beebe et al., 2000).

Methodological considerations

In the following section we will offer reflections on the use of the EA Scales. Several special journal issues on the topic (see Biringen & Easterbrooks, 2008, 2012; Easterbrooks & Biringen, 2000, 2005, 2009) have explored methodological issues, as well as application across different samples and ages. There presently, then, is a "critical mass" of knowledge upon which to reflect (more than 100 peer-reviewed publications).

One advantage of using the EA Scales is that they provide a multi-dimensional assessment of the emotional availability framework by including multiple scales for evaluating caregiver and child behavior. A methodological concern, however, is the inflated correlations among scales. Data from a number of studies using distinct scales demonstrate quite high correlations among scales in many circumstances (Biringen & Easterbrooks, 2012). Theoretically, sensitivity (positive affect, responsiveness) can be very highly related to structuring (guiding, appropriate control, child empowering behaviors of the caregiver), but they are separable dimensions that may be confused unless the differences are

made very clear to the observer. Lack of a clear understanding of the differences between the scales increases the danger of a "halo effect" whereby a coder will code all dimensions similarly high (or low).

Researchers or evaluators can make active efforts to limit the interdependence of these dimensions. Some strategies might include: (a) rigorous training and checks on coder fidelity to the coding process; (b) having coders do multiple "views" of the interaction, coding only a single dimension during each view (and perhaps only after coding different dyads before returning to the original dyad to code another dimension; and (c) having separate coding teams for adult and for child coding. These strategies are being emphasized in the use of the system, but multicollinearity issues remain in many studies (e.g., Altenhofen et al., 2013), whereas others have reported moderate correlations across scales (John et al., 2012). One recommendation would be to use different contexts to assess these dimensions, as a brief play context is unlikely to show the range that a longer, naturalistic observation, with variations in stress levels, may allow.

One of the strengths of the EA Scales is its multi-dimensional lens on parent–child relationships. This does sound appealing, but have the scales really delivered on this promise? When one combs the literature, in fact most studies focus on the sensitivity dimension. There are few findings related to the non-hostility dimension, for example. One interesting finding is that Australian mothers who demonstrate less maternal hostility (greater maternal non-hostility) with their securely attached 12-month-old infants also have been shown to consider their infant as a separate individual with desires and emotions (Mind Mindedness), as compared to mothers who do not have this perspective (Lok & McMahon, 2006). Another study examining non-hostility was conducted in Canada by Stack et al. (2012), who utilized a longitudinal intergenerational design with very-low income, multi-stressed families. They reported two studies in their paper, the first examining EA in mother–child interactions during preschool and then later during middle childhood. Their Study 2 examined a different sample of children and their mothers tested at 5 time points – at 6 months, 12 months, 18 months, preschool, and school age. In both studies, they found that mothers with a history of aggression (either internalized or externalized, as rated by their peers during childhood) were more likely to be hostile with their children. The study is particularly interesting in that specialized contexts to elicit hostility were not employed; this is a very low-income sample where hostility may be more severe and palpable. However, in most studies, particularly with low-risk populations, we may need to include contexts that evoke frustration or that are in some way inherently stressful, such as long sessions that create fatigue, or go back in time to naturalistic contexts, or simulation of naturalistic contexts (Ainsworth et al., 1978) in order to adequately assess the non-hostility dimension. Including contexts that can highlight parental non-hostility may be important for future research. The EA non-intrusiveness dimension has been a focus of a number of investigations, and studies have found that this quality is impaired in substance-abusing mothers (e.g., Salo et al., 2010; Swanson et al., 2000), but more varied or longer naturalistic contexts may be able to provide additional information.

There are also unknowns about the system (as would be the case for any set of global scales). For example, are the biases or stereotypes that the observer holds important? If parental animation is viewed in a particular culture as a positive quality, then the observer from that culture may "look for" this quality when judging emotional availability. Similarly, a more neutral or introverted presence may be viewed as a negative in some cultures, while it is considered a sign of humility and maturity in other cultures. While training is likely to decrease biases, it is unlikely that subjective or (potentially) culturally grounded perceptions can ever be fully eliminated. In a related vein, it is unclear why some people learn the system readily, whereas others take longer, even within comparable levels of experience and professional background. Background in attachment specifically has been noticed as a key prerequisite, but these issues have not been fully explored.

Recent developments and future directions

Aspects of the system. The newest (4th) edition of the coding manual includes the Emotional Attachment & Emotional Availability (EA2) Clinical Screener, which also provides not only the means to summarize the EA Scales, but also a means to provide an "attachment" score. The screener ranges between 1 and 100, and an adult–child relationship is assigned into one of four zones – "problematic

zone" (1–40), "detachment" (41–60), "complicated emotional availability" (61–80), and "dyadic emotionally availability" (81–100), with the lowest three zones all considered "risky", albeit at different levels. The EA2 Clinical Screener provides a dimensional and pattern approach that has been validated against the DC 0-3 PIRGAS (Espinet et al., in press) and Attachment Q-Sort for child care providers (Baker & Biringen, 2012). We mention this although the focus of this review has not included this additional component of the system. In addition, we mention the 36-item parental EA Self-Report, which maps onto the observational EA Scales, but only to some extent (Vliegen et al., 2005, 2009). Not surprisingly, observations of EA are not identical to mothers' self-reports, although mother's perceptions hold value and merit. In some cases, such discrepancies may suggest that mothers' views are based on information not available to the objective observer, while for other cases such discrepancies may bear an element of denial or mis-perception. Additional applications, including a therapist/interventionist version, are now available, with initial findings that this construct can be used empirically in the therapy setting (Söderberg, Elfors, Holmqvist Larsson, Falkenström, & Holmqvist, 2013). As yet, there is no empirical work on EA in the couple's relationship although a manual has been created (Biringen, 2008).

Ethnic diversity and cross-national comparisons. The EA Scales are a part of published research in at least 22 countries (as shown in Table 1 and at least another 4 countries not represented in the table, given the ongoing empirical research), as well as all major US subcultures (with the exception of American Indian, which is an ongoing project, Michelle Sarche, personal communication, 2013). They show adequate reliability and validity in each of these cultures, but few studies actually have tackled cross-cultural or sub-cultural comparisons to understand levels of EA in different cultural contexts. The few exceptions are noted in Table 1 (e.g., Bornstein et al., 2008, 2010; Derscheid, 2013).

A study of child well being (measured in terms of: health and safety; education; behaviors and risks; and housing/environment with the rankings of countries done on average ranking positions) in "rich" countries was conducted by UNICEF (2007), including the following: Netherlands, Norway, Iceland, Finland, Sweden, Germany, Luxembourg, Switzerland, Belgium, Ireland, Denmark, Slovenia, France, Czech Republic, Portugal, United Kingdom, Canada, Austria, Spain, Hungary, Poland, Italy, Estonia, Slovakia, Greece, United States, Lithuania, Latvia, and Romania. In this order, the top third on child well being included the first 10 countries, with Netherlands leading that grouping, the middle third included Denmark to Hungary, and the bottom third included those after Poland. Unfortunately, the bottom third includes the Unites States. In some of the research findings they compiled, qualities of mothering are included, such as sensitivity and responsiveness. But, much of the work is focused on children who can tell about their situation, rather than young children and there is no direct observation of parent–child relationships. With some concerted effort, it may be that research on the EA Scales can provide additional information on the state of child well being (using this observational lens). To facilitate such cross-cultural work, numerous translations have been completed (e.g., Finnish, German, and Japanese) and others likely will occur.

It may be interesting to ask the following questions related to ethnicity and culture. How do cultural expectations change EA? Do parents get consumed with what society says they "should" or "should not" be doing that they lose sight of the individual needs of the child? For example, do parents become too intrusive when toilet training or lack sensitivity when introducing infant sleep training and let infants "cry it out"? Do particular cultural expectations set unrealistic goals for the parent–child dyad? These are some of the questions that can be posed to parents during interviews and that can help us further understand their motivations for relating to their children as they do.

Conclusion

In this paper we addressed both theoretical and methodological aspects of the EA Scales, critically reviewing some 112 published empirical articles. Here, we want to applaud the 26 additional conceptual pieces (e.g., Aviezer, 2008; Barone & Biringen, 2007; Beeghly, 2012; Biringen, 2000, 2005; Biringen & Easterbrooks, 2000, 2008, 2012; Biringen & Robinson, 1991; Biringen, Damon, et al., 2005; Biringen, Fidler, et al., 2005; Biringen, Skillern, et al., 2005; Biringen et al., 2009; Bornstein et al., 2012; Brok & de

Zeeuw, 2008; Easterbrooks & Biringen, 2000, 2005; Emde, 1980, 1983, 2000, 2012; Emde & Easterbrooks, 1985; Harnett & Dawe, 2012; Oppenheim, 2012; Robinson & Biringen, 1995; Robinson, Emde, & Korfmacher, 1997; Salo & Flykt, 2012, 2013) that help us to consider both links with attachment and with other important constructs. Notably innovative is the conceptual link with the construct of mindfulness (Harnett & Dawe, 2012). Emotional availability and mindfulness have much in common, focusing less on reflective functioning and more on bodily or emotional presence, less on doing and more on being, and intrapsychic mindfulness may be the relationship with one's self that aids in becoming emotionally available in relationships with others. Given this interface, the EA interventions have now incorporated mindfulness practice, with some ongoing studies. More basic and clinically relevant work is needed to provide nuanced applications of the EA Scales to enhance current theory and practice.

Our conclusion is that the EA Scales are a valid and sensitive measure of relational dyadic affective quality, and are associated with, and predictive of, child and parent socioemotional adaptation and child–parent attachment. The system was inspired, in part, by attachment theory and data demonstrate empirical linkages with attachment. Generally speaking, however, EA is a more broadly-based construct than attachment, with emphasis not only on distress and stress contexts, but also on positive emotions and fun-filled times, not only on parental sensitivity, but also "non-attachment" qualities, such as structuring, non-intrusiveness, and child involvement.

With that said, we would like to leave the reader with several issues to ponder. First, it is important to consider the separateness of the two sides of a dyadic relationship (as conceptualized in EA). This recognition acknowledges that a parent's sense of closeness may not be reciprocated (in kind) by the child, and such disparities may be more likely to occur in our contemporary society where a child is likely to experience multiple caregivers (Aviezer et al., 1999), when a child inhabits multiple households, as in the case of shared physical custody in divorced/divorcing families (Altenhofen et al., 2010); or when a child experiences foster care (Altenhofen et al., 2013), and/or adoption (Garvin et al., 2012; van den Dries, 2012) than when the attachment construct was originally conceptualized (Bowlby, 1969). In a related vein, the child's side of EA has been found to provide unique information in relation to children's attachment and adaptation in both typical (e.g., Moreno et al., 2008) and less typical populations (e.g., John et al., 2012).

Second, not only is it important to consider the child's side of a relationship, as separable from the parent side (e.g., child over-responsiveness to an insensitive mother or child over-responsiveness to a generally sensitive mother), it also is important to consider that child-to-parent attachment and parent-to-child attachment are separable constructs. Although Ainsworth's conceptualizations of mother–child interactions focused on the *maternal* side and her measure of attachment focused on the *child's side* of the relationship (Ainsworth et al., 1978), with other assessments consistent with this view (e.g., Attachment Q-Sort; Waters & Deane, 1985), we propose the innovative idea that both global relationship quality *and* attachment need to be understood from the standpoint of each participant in the relationship, and such a relationships perspective may emerge in the early years, but become even more evident with development as well as the passage of time.

In future work, we will further theorize about this "relationships view of attachment" and will report on the use of the EA2 Clinical Screener (EA2-CS), which yields a parent attachment score and a child attachment score. Separable scores are assigned to the parent and to the child, based predominantly on overall case conceptualization and the sensitivity and child responsiveness scores, respectively. Thus, we propose the beginnings of a relationships perspective on attachment, with implications for applied use, such that investigators and/or clinicians can benefit from the dimensional view of relationships that help build momentum into prevention/intervention programming as well as therapy, yet also benefit from the "patterns of attachment" that Ainsworth so eloquently presented to the field (Ainsworth et al., 1978). We suggest that attachment should now be viewed as an evolving relationship system, with an observational lens on both the parent and the child.

Using the EA Scales in conjunction with other attachment measures and seeing how the dimensional, relationship framework of the EA system may supplement other independently assessed attachment measures (as there will be variation within the "insecurely attached" and "securely attached" groups in child functioning) would be an important way to predict children's outcomes and to enrich the concept of attachment. The categorical conceptualization of attachment may have lim-

ited our thinking about the strengths as well as vulnerabilities inherent within these different categorical distinctions.

We also encourage an understanding of EA in the context of the couple relationships and the family system (Biringen, 2008). Understanding emotional interaction in a family context was considered as a gap in the literature on EA (and attachment), but family context needs to involve not only sequential recordings of mothers and fathers in interaction with their child(ren), but should include assessments of how families are when they are together and under naturalistic situations that provide enough time to get to know the family. The EA Scales may bring additional insights to understanding family-wide interactions, and future research can determine whether the dyadic approach that is part of the EA framework can best describe relationships in all cultural contexts or whether a non-dyadic, "family" approach may further enhance our understanding of children and their caregivers.

The EA literature is impressive in terms of the establishment of construct validity, but divergent validity has been overlooked. For example, we know little about how temperament or other biological attributes (including genetic predispositions) may/may not impact the development of EA and its evolution over time. For example, some children are highly reactive and need a great deal of environmental nurturance in order to thrive (the "orchids") while others are hardy and survive under a wider range of conditions (the "dandelions") (Boyce & Ellis, 2005), but these children may respond quite differently to similar levels of parental nurturing. Not only does this suggest that the child side of the relationship needs to be better understood, but also that attachment needs to be reconceptualized as a relationship phenomenon. For example, Roisman, Padron, Sroufe, and Egeland (2002) reported that adults who were classified as "earned secures" in the Adult Attachment Interview (Main et al., 1985; Pearson, Cohn, Cowan, & Cowan, 1994) actually had had some of the best caregiving (in this sample) during infancy and early childhood. They suggest that the issue may not have been a lack of early maternal sensitivity at all, but how these individuals received that sensitivity, potentially because of their biological and/or genetic proclivities, and, thus, evidence for the "goodness of fit" model (Lerner, 1984).

In the discussion of "orchids" and "dandelions" in the literature (Boyce & Ellis, 2005), the emphasis thus far has been that the orchid will thrive under optimally nurturing conditions, but this is conjecture and what is optimal is very much based on how the environment is perceived and received by that individual. This statement does not take the heat off of parenting, but simply recasts parenting as a relationship phenomenon, whereby the child output is not linear in relation to the parent input. Relational developmental systems theories (Lerner, 2011) embrace this notion of person-context interactions, whereby parenting, and children's development, are recast as relationship phenomena. In this integrative review, we frame the concept and measurement of emotional availability with attachment, as well as the broader field of social/emotional development, and suggest a relationships perspective is consistent with the tenets of both theoretical constructs.

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