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RESEARCH ARTICLES

Short-Term Reliability and Continuity of Emotional Availability in Mother–Child Dyads Across Contexts of Observation

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Emotional availability (EA) is a prominent index of socioemotional adaptation in the parent–child dyad. Is EA affected by context? In this methodological study, 34 mothers and their 2-year-olds were observed in 2 different settings (home vs. laboratory) 1 week apart. Significant cross-context reliability and continuity in EA as measured with the *Emotional Availability Scales* emerged. Because EA is not affected by context, cross-context generalizations about EA status in the dyad may be warranted. This work further documents the adequate psychometric properties of emotional availability.

Emotional Availability

Emotional availability in the parent—child relationship lies at the heart of healthy socioemotional adaptation in both child development and caregiving. Emotional availability (EA; Emde, 1980; Emde & Easterbrooks, 1985) describes the quality

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of emotional exchanges between children and their parents. EA is a relationship construct that captures each partner's accessibility to the other and the ability of each partner to read and respond to the other's emotional communications (Biringen & Robinson, 1991). By 24 months, the age studied here, children have normally begun to make significant developmental strides in the realm of emotions, and they commonly convey cues that indicate their emotional needs (Barnard, 1976; Barnard et al., 1989). Young children not only interpret the psychological states of others but also experience those states affectively, and they display sensitivity and responsiveness to maternal emotions (see Bronson, 1974; Clarke-Stewart & Hevey, 1981; Edwards & Liu, 2002; Eisenberg & Valiente, 2002; Lillard & Witherington, 2004; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). Reciprocally, emotional displays in parents serve to communicate, engage child attention, and extend social interaction (Martin, Clements, & Crnic, 2002). Because emotional expressiveness is a primary dimension on which the quality of caregiving varies, maternal emotional displays are thought to underpin mothers' responsiveness, sensitivity, and contingency (Zhou et al., 2002). In short, the emotional availability framework reflects "a global way to describe the overall quality of the affective relationship" between child and parent (Biringen, 2000, p. 112).

The emotional availability construct thus enhances our understanding of infancy and parenting. However, few studies have systematically examined its psychometric properties, even though the empirical and clinical value of such developmental assessments depends on adequate psychometrics (Bornstein, Gaughran, & Homel, 1986). Exploring these characteristics of EA is also important because the extent to which variation in EA represents the dyad's characteristic "emotional climate" (Biringen & Robinson, 1991) versus other circumstances (age, time, or observational setting) is still to be fully understood. Specifically, it is unclear whether EA in children of different ages and in mothers shows reliability or stability and continuity across contexts of observation. Our primary goal in this study was to address that issue. We used the Emotional Availability Scales (EAS; Biringen, Robinson, & Emde, 1998), which were designed to assess the construct of EA through observations of interactions of child (two scales: Responsiveness and Involving) and parent (four scales: Sensitivity, Structuring, Noninstrusiveness, and Nonhostility).

Reliability and Continuity of Emotional Availability Across Time and Context

Traditional developmental science is concerned to assess manifestations of constructs, structures, processes, or functions, but also their group mean level as well as individual variation about the mean across time and context (Hartmann & Pelzel, 2005). We define *reliability* (and *stability*) as consistency across time or

context in the relative ranks of individuals in a group. We define *continuity* as consistency in group mean level across time or context. For example, reliable/stable and continuous describes the situation in which individuals in the group are consistent in their relative ranks, and the group mean level remains consistent. Reliability/stability and continuity are statistically independent and reflect conceptually independent realms of development (Bornstein, Brown, & Slater, 1996; McCall, 1981; Wohlwill, 1973); that is, rank order and mean level analyses do not assess identical features of development across time or context. For the former, significant correlations give evidence that individuals maintain their rank within the group consistently across time or context; for the latter, nonsignificant differences in mean level give evidence that the group behaves consistently across time and context.

Previous studies employing multiple assessments of the EAS across time or context have shed preliminary light on the issues of reliability/stability and continuity, but not all report both rank order and mean level, and few have studied context specifically (indeed, some studies have confounded time and context). Ziv, Gini, Guttman, and Sagi (1997) examined EA at 6 months at home and at 12 and 20 months in the laboratory. Both mother and child scales were stable across the three time points. Biringen et al. (1999) rated EA at home when children were 9, 12, and 14 months. Some maternal and child scales were continuous, but others showed discontinuity (i.e., increase in mean level). Biringen, Matheny, Bretherton, Renouf, and Sherman (2000) studied dyads at home when children were 18 and 24 months and at 39 months in the laboratory. Maternal scales proved stable between home visits, but no relations were found to the laboratory assessment. Finally, Bornstein, Gini, Suwalsky, Leach, and Haynes (in press) studied 5-month-old infants and their mothers twice at home with 1 week intervening. Individual EA scales showed short-term reliability and continuity. Having established these psychometric characteristics in the same context across 1 week, the time frame also covered in this study, we undertook to examine how varying contexts of observation might specifically affect EA.

Developmental research is commonly conducted in laboratories as well as in more naturalistic contexts, like the home. However, Bronfenbrenner (1977) admonished developmental scientists about generalizing from laboratory assessments to the everyday world of the child. Early childhood is a highly reactive stage of life, and young children and parents may behave differently in the familiar home versus in an unfamiliar (e.g., laboratory) setting. These two contexts may evoke different feelings and motives (e.g., of stress or conformity) and provoke different behaviors in children and mothers. For example, behavior may be freer and more distributed in the home, whereas elsewhere (as in the laboratory) demand characteristics might be greater, and behavior may be more constricted and interactional opportunities more restricted. Examining the same dyads in different settings also promises to inform researchers and clinicians how best to

judge the representativeness of EA obtained in studies or observations that do not systematically contrast contexts of observation.

Holden and Miller (1999) concluded that stability of parenting across physically different contexts, specifically the laboratory versus the home (as we do here), is relatively underresearched, and existing studies show contradictory patterns of association between measures like the EAS. Specifically, Ziv et al. (1997) found strong relations in EA between the two settings, but Biringen et al. (2000) did not. More generally, some research suggests that mean level differences in parenting are sensitive to context (Belsky, 1980; Kniskern, Robinson, & Mitchell, 1983), but other research reports no mean differences (Borduin & Henggeler, 1981; Bornstein, Haynes, O'Reilly, & Painter, 1997). Some investigators report significant cross-context correlations (Casey, Barrett, Bradley, & Spiker, 1993; O'Brien, Johnson, & Goetz, 1989) even cross-culturally (Zevalkink & Riksen-Walraven, 2001), whereas others report the opposite (Belsky, 1980). Finally, some studies report that the consistency of parenting across contexts depends on the feature of parenting that is assessed; some parental behaviors show consistency, whereas others do not (Bornstein, Tamis-LeMonda, & Haynes, 1999; Crockenberg & Litman, 1990; Laible & Thompson, 2002; Miller, Shim, & Holden, 1998; Rothbaum & Crockenberg, 1995; Stevenson, Leavitt, Roach, Chapman, & Miller, 1986).

Taken together, extant findings leave some central psychometric questions about EA unaddressed. Results are especially incomplete with respect to issues of short-term reliability and continuity across context. Not every study systematically reports both reliability and continuity data. Additionally, given the long-term longitudinal nature of some studies, it is difficult to know when to attribute instability in dyadic EA to varying contexts, to real developmental change related to the sometimes relatively long intervals between assessments, to interactive developmental processes, or to psychometric properties of the measures.

This Study

This study reports the short-term reliability/stability and continuity of measurement of EA across two physically different contexts over a 1-week interval. Insofar as EA is believed to reflect general qualities of the dyads' emotional climate, we predicted that measures of child and mother EA would be little influenced by environmental contexts, so long as contrasting settings for the dyad were not radically different. In addition, if EA proved consistent across contexts we would argue that any temporal reliability/stability of EA is not exclusively a by-product of a consistent context (Roberts & DelVecchio, 2000). We addressed issues of contextual consistency of the EAS among 24-month-olds and their mothers during two free-play observations conducted approximately 1 week apart. In addition, the sample we recruited was balanced with respect to child gender so that potential differences in EA between girls and boys, and mothers of girls and

mothers of boys, could be examined (Fagot, 1995; Leaper, 2002; Ruble & Martin, 1998). This study extends our earlier research (Bornstein et al., in press) in several ways. First, 24 months is a different stage of life from 5 months for both children and mothers, and accordingly the constructs pertaining to EA are operationally defined differently at the two ages (according to children's communicative skill level; e.g., a young infant has different means of involving mother in activities and play as compared to those of a verbal, locomoting older infant). Second, we address the question of how variation in context might affect EA. Third, we use a different sample.

METHOD

Participants

Altogether, 34 mothers and their 24-month-olds (17 girls, 17 boys), recruited through mass mailings and newspaper advertisements, participated in a two-visit study. Mothers provided sociodemographic information about child gender, birth weight, and health; parental age, education, occupation, and marital status; family intactness; and the number of hours of maternal employment per week outside the home. On average, children were 23.91 months of age (SD = 0.36) at the time of the first observation. They were firstborn, term, weighed at least 2,500 g at birth (M = 3598.0, SD = 469.2), had not experienced any prenatal or postnatal health complications, and were healthy at both times of the study.

Mothers averaged 31.76 years of age (SD = 4.45, range = 24.22–41.72) and were White, resided in a suburban area, and represented the middle to upper range of socioeconomic status (SES; Hollingshead [1975], Four-Factor Index of Social Status; M = 57.57, SD = 5.51, range = 46.50–66.00; see Bornstein, Hahn, Suwalsky, & Haynes, 2003). All mothers were married at the time of the study and living with the child's father. Parents' education level ranged from partial college to postgraduate degrees. The majority of mothers (70.5%) were employed at the time of the study, working on average 26.5 hr per week outside the home (SD = 11.9, range = 8.0–45.0).

Procedure

Naturalistic samples of mother–child interaction were videotaped in two sessions an average of 6.26 days (SD = 2.19) apart, one session in the home and one in the laboratory. Home and laboratory visits were counterbalanced. During each session, mother and child were filmed for 8 min of collaborative free play. The findings of previous studies using 5- to 10-min observations lend credence to their validity in measuring EA (Easterbrooks, Biesecker, & Lyons-Ruth, 2000; Swanson,

Beckwith, & Howard, 2000; Ziv, Aviezer, Gini, Sagi, & Koren-Karie, 2000). Each mother was asked to play with her child as she ordinarily would. Mothers were under the same instructions during both the home and laboratory visits.

The laboratory playroom $(10.5 \times 16.5 \text{ ft})$ was entirely novel to the mother and child, but was set up as a homelike environment, including carpeting, comfortable chairs, child-sized furniture, and freedom from office noises (as recommended by McCune-Nicolich & Fenson, 1984). Two equivalent sets of standardized, realistic, age-appropriate toys were counterbalanced across visits, and selected to have comparable numbers of toys considered feminine, masculine, and gender-neutral (Caldera, Huston, & O'Brien, 1989). A setup and familiarization period was constant in both locations (as recommended by Stevenson et al., 1986). At the conclusion of each visit, both mother and filmer independently evaluated the session.

Assessments

Emotional availability. EA in the mother-child dyad during each session was evaluated from the videotapes using the EAS Infancy to Early Childhood Version (3rd ed.; Biringen et al., 1998). The EAS consist of six globally rated dimensions concerned with emotional communication and interaction in the parent-child dyad. The anchor points of the scales are defined in whole points, but we coded by half-points. Child Responsiveness assesses the child's age-appropriate ability and interest in exploring on his or her own and in responding to the mother's bids (i.e., the balance between connection and autonomy) as well as on the extent of the child's enjoyment of the interaction; scores range from 1 (nonoptimal) to 7 (optimal). Child Involving of Mother assesses the child's ability and willingness to engage the mother in interaction; scores range from 1 (nonoptimal) to 7 (optimal). Maternal Sensitivity assesses the parent's contingent responsiveness to child communications, appropriate affectivity, acceptance, flexibility, clarity of perceptions, affect regulation, conflict resolution, and variety and creativity in play displayed toward the child; scores range from 1 (highly insensitive) to 9 (highly sensitive). Maternal Structuring assesses the degree to which the mother appropriately facilitates, scaffolds, or organizes her child's play, exploration, or routine by providing rules, regulations, and a supportive framework for interaction without compromising the child's autonomy; scores range from 1 (nonoptimal) to 5 (optimal). Maternal Nonintrusiveness assesses the degree to which the mother is able to support her child's play, exploration, or routine by waiting for optimal breaks before initiating interactions, without interrupting the child by being overdirective, overstimulating, overprotecting, or interfering; scores range from 1 (intrusive) to 5 (nonintrusive). Maternal Nonhostility assesses the degree to which the mother is able to talk to or behave with her child in a way that is generally patient, pleasant, and harmonious and not rejecting, abrasive, impatient, or antagonistic; scores range from 1 (markedly hostile) to 5 (nonhostile). A more

complete description of the EAS may be found in Biringen and Robinson (1991) and Biringen (2000).

Home and laboratory sessions were coded independently by two different trained reliable coders; each coder coded approximately half of the home and half of the laboratory sessions. For purposes of interrater reliability, a third reliable coder coded 20% of home cases and a different 20% of laboratory cases. Intercoder reliability coefficients, based on these cases, were computed using average absolute agreement intraclass correlation coefficients (ICCs) in a two-way random-effects model: Responsiveness, .96; Involving, .87; Sensitivity, .93; and Structuring, .76. ICCs for Nonintrusiveness and Nonhostility could not be computed due to restriction of range; using within one-half point scale as matches between coders, agreements for these scales were 93% and 100%, respectively. Any residual differences between coders were resolved by discussion, and consensus ratings were used for subsequent analyses (13 individual consensus ratings were used, which constitute 3.2% of all ratings).

Evaluation of the home and laboratory visits. As a check against threats to validity, at the conclusion of both the home (H) and laboratory (L) visits the mother and the filmer independently evaluated the observation session by marking a series of 8-point (range = 0–7) graphic rating scales, randomly ordered with respect to valence but recoded in ascending order. According to the filmer's evaluation, mothers were not anxious ($M_H = 1.3$, $SD_H = 1.5$; $M_L = 1.3$, $SD_L = 1.5$), and children were not fussy ($M_H = 1.7$, $SD_H = 1.7$; $M_L = 1.7$, $SD_L = 1.5$). Mothers also reported that their children were in good health during the observation ($M_H = 5.9$, $SD_H = 1.9$; $M_L = 6.3$, $SD_L = 1.4$) and that their children's play behavior ($M_H = 5.0$, $SD_H = 1.6$; $M_L = 5.3$, $SD_L = 1.4$) as well as their own ($M_H = 4.9$, $SD_H = 1.4$; $M_L = 4.8$, $SD_L = 1.5$) during each visit was characteristic of their normal routine. Paired *t*-test analyses revealed no significant differences between visits on these variables. These data suggest that our observations were broadly representative of the dyads' usual interactions.

RESULTS

Preliminary Analysis

Distributions of the six individual EAS from the two visits were examined for normalcy and outliers. Maternal Nonintrusiveness and Nonhostility at both visits were significantly skewed, all ps < .05, and were therefore treated as ordinal (rather than interval) variables. The skewed distribution of the Nonintrusiveness and Nonhostility scales is not surprising; these two scales were designed to capture specific types of negative behaviors that should be uncommon in low-risk samples. In addition, we tested for gender and child age effects on the scales. Despite the

narrow range of child age (23.29-24.74 months), significant correlations emerged between child age and Sensitivity, Structuring, Responsiveness, and Involving (rs = .43-.51, ps < .01). Because the same pattern of results was obtained controlling for child age and to conserve power, the results reported here do not control child age. Furthermore, because no gender differences were found among any of the EAS for either visit, data are reported for girls and boys combined.

Analytic Plan

The first and second sections of Results provide descriptive statistics and intercorrelations for EA ratings for each visit. The third section explores reliability by presenting bivariate individual variable analyses linking EAS ratings from each visit for children and for mothers. The fourth section examines continuity employing paired comparisons of individual EAS means.

Descriptive Statistics for the Emotional Availability Scales

Table 1 presents descriptive statistics for each EAS separately for home and laboratory visits. All scales had a reasonable representation of most of their potential range.

Intercorrelations Among the Emotional Availability Scales

Intercorrelations among EAS are presented separately for home and laboratory visits in Table 2. All six scales were strongly positively associated in both contexts: The mean intercorrelation for the home visit was .75 and for the laboratory visit .85 (ranges = .54–.93 and .67–.98, respectively, all ps < .05). Distributions and intercorrelation patterns in this sample resemble those reported in previous studies (e.g., Biringen, 2000).

Reliability of Emotional Availability Scales Across Contexts

Table 1, column r summarizes the correlations. For child Responsiveness and Involving and maternal Sensitivity and Structuring, Pearson's product—moment correlation coefficients (r) were calculated, and for maternal Nonintrusiveness and Nonhostility, Spearman's rank-order correlation coefficients (r_s) were computed. Except for Nonintrusiveness and Nonhostility, all EAS from the home visit were strongly related to their corresponding scales from the laboratory visit, all ps < .001; Nonintrusiveness and Nonhostility were moderately related in the two contexts, ps < .05 and .01, respectively.

Descriptive Statistics, Correlations, and Paired Comparisons of Emotional Availability Scales at Age 24 Months by Location of Visit (N = 34) TABLE 1

		Home Visit		Laı	Laboratory Visit				
EA Scales	M / Mode	SD	Range	M / Mode	as	Range	$r(32)^{e}$	t(33) ^f	d^g/CI^h
Child scales									
Responsiveness ^a	5.28	1.19	3.0–7.0	5.07	1.59	1.5-7.0	.61***	94	.161
Involving ^a	5.19	1.32	2.0–7.0	5.01	1.65	1.5–7.0	.58***	.74	.127
Maternal scales									
Sensitivity ^b	6.50	1.60	4.0–9.0	6.43	1.79	2.5–9.0	.64***	.30	.051
Structuring ^c	4.04	.82	2.5-5.0	4.09	1.06	2.0-5.0	.61***	30	.052
Nonintrusiveness ^c	5.00	.35 ^d	2.0-5.0	5.00	$.4I^{ m d}$	2.0-5.0	.31*	55	-0.75, 0.75
Nonhostility ^c	5.00	.41 ^d	2.0-5.0	5.00	.29 ^d	2.5-5.0	.42**	23	-0.75, 0.75

Note. Frequency tables for all scales are available from the authors on request.

^eRoman values are Pearson product-moment r coefficients, and italicized values are Spearman's rank order r_s coefficients. ^fRoman values are student t tests, and italicized values are paired Wilcoxon signed-ranks test T⁺ statistics. ²Cohen's measure of effect size. ¹95% nonparametric confidence interval for sample's ^aRange of possible ratings: 1–7. ^bRange of possible ratings: 1–9. ^cRange of possible ratings: 1–5. ^dProportion of cases in nonmodal categories (italicized). pseudomedian estimate of rank differences (italicized).

p < .05. **p < .01. ***p < .001 (1-tailed)

TABLE 2 Intercorrelations Among Emotional Availability Scales for Home Visit and Laboratory Visit at Age 24 Months (N=34)

EA Scales	Responsiveness ^a	Involving ^a	Sensitivity ^a	Structuring ^a	$Nonintrus iveness^b$	Nonhostility ^b
Child scales Responsiveness ^a		.93*	*06.	*57.	.63*	.56*
Involving"	*86.		*16.	.75*	*/9:	.62*
Maternal scales						
Sensitivity ^a	.95*	*56.	1	*88.	*59.	*89`
Structuring ^a	*68.	.92*	.94*	I	.54*	*99`
Nonintrusiveness ^b	.71*	.72*	.72*	*29.		.54*
Nonhostility ^b	.71*	.71*	.71*	.73*	*47.	

Note. Correlations above the diagonal are for home visits, and correlations below the diagonal are for laboratory visits. a Pearson product–moment r coefficients. b Spearman's rank order r_{s} coefficients.

^{*}p < .001 (1-tailed).

Continuity of the Emotional Availability Scales Across Contexts

To test whether the EAS maintained the same average level across the two contexts, paired t tests were employed for scales that satisfied the normality assumptions (i.e., Responsiveness, Involving, Sensitivity, Structuring), and their nonparametric equivalent, the Wilcoxon two-sample paired signed-ranks test, for scales that did not satisfy these assumptions (i.e., Nonintrusiveness, and Nonhostility). Table 1, column t presents the results of these analyses. EA ratings did not differ between home and laboratory. Given the small effect sizes (column d/CI), these results are consistent with the notion of continuity of EA across different contexts.

DISCUSSION

This study of dyadic EA examined the reliability/stability and continuity of children's and mothers' EA in different environmental settings, specifically home and laboratory. We also examined gender differences in EA. Addressing these measurement issues is fundamental to validity aspects of socioemotional research in infancy and parenting. Despite an increased understanding of socioemotional function in development (Eisenberg & Fabes, 1998), some basic methodological questions are still unanswered. This study addressed one: how emotional availability varies with changes in contexts not normally a part of children's experience. Contexts that contrast with the home are of particular relevance for research investigations of EA.

With respect to this question, we found significant and robust short-term reliability of children's and mothers' emotional availability across contexts when children were 24 months of age. Furthermore, we found that child and mother EA did not change in mean levels across the change in context. These independent reliability and continuity findings mutually reinforce the notion of consistency in EA: EA appears to reflect a characteristic that is part of the child–mother dyad that transcends time and context. Insofar as measures of child and mother EA are (at least) moderately reliable and continuous across contexts, individual differences in EA appear to reflect intrinsic general qualities of the dyads' emotional climate. These results extend those of Bornstein et al. (in press) with an independent sample of children of a different age to an assessment of home versus laboratory. Whereas Bornstein et al. (in press) found evidence of short-term temporal reliability and continuity in EA in the same context (the home) at 5 months, here we report evidence of reliability and continuity across contexts at 24 months. Confirming the psychometric properties of reliability/stability and continuity of EA

at different ages in independent samples enhances the validity of both the construct and the measure. That EA is consistent across different contexts further indicates that it is not a consistent environment that mediates temporal reliability/stability or continuity of EA (Roberts & DelVecchio, 2000). In light of these results, any reports of lack of long-term stability in EA presumably reflect longer test—retest intervals (e.g., mediating possible accumulated life events) or real developmental changes. One task of our future research is to disentangle these alternatives.

In addition, and in agreement with other studies employing the EAS (e.g., Bornstein et al., 2005; Ziv et al., 2000), in our study dyadic EA did not differ between mother-daughter and mother-son pairs. The construct of EA and the EAS appear to be equally relevant for dyads with children of different genders.

This study contributes to the short-term psychometric adequacy of the EAS for children and mothers. Insofar as dimensions of child Responsiveness and Involving and maternal Sensitivity, Structuring, Nonintrusiveness, and Nonhostility are reliable and continuous across contexts and over a short time interval, the significance of EA as a socioemotional construct and as a global measure of mother–child interaction is enhanced. Another step in future research is to ask whether and how greater contrasts in context might affect EA. Culture is one, and region within culture is another. We have found that both meaningfully relate to base levels of EA (Bornstein et al., 2006).

Although it is natural to expect variation in parenting across contexts, the assumption that parenting shows a meaningful degree of cross-contextual consistency is inherent in theories that focus on the influence of parenting on child development (see Holden & Miller, 1999). In this regard, the consistency of parenting across contexts is nontrivial. Persistent and systematic childrearing practices are often credited with affording experiences that influence the course and outcome of individual development (e.g., Bakeman, Adamson, Brown, & Eldridge, 1989; Bornstein, 2002; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Maccoby, 2000; Vandell, 2000). It has been asserted that through repeated early experiences young children come to process information and develop associations that they apply more broadly as they grow (Rovee-Collier, 1995). In other words, "in theories of childrearing, parental behavior is assumed to have effects on children through a history of experiences. There is faith that, over time, parental influences lead to generalized behavioral tendencies that have some durability" (Radke-Yarrow, Zahn-Waxler, & Chapman, 1983, pp. 501-502). If parents' interactions with their children varied across contexts, then drawing valid conclusions about the nature of relations between parenting and child outcomes would be compromised. That consistency is shown begs yet another research step; namely, to validate the meaningfulness of EA on external criteria preferably through the prospective prediction of later behavior; our research program has now turned to assessing the predictive validity of EA as well.

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