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Stability in Mother-Child Interactions from Infancy through Adolescence

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SYNOPSIS

Objective—The current study examines homotypic stability in mother-child interactions, applying similar rating scales of mother-child interactions at 1 and 4.5 years, and heterotypic stability from 1 to 13 years and 4.5 to 13 years, using conceptually similar but not identical rating scales at age 13.

Design—We coded videotaped mother-child interactions in 202 families when children were 1, 4.5, and 13 years of age during age-appropriate and developmentally salient structured tasks for relationship quality.

Results—Multiple regression analyses controlled for the effects of child birth order and gender as well as maternal age and education. Maternal and dyadic, but not child, mother-child interaction qualities at 1 year significantly predicted similar or equivalent constructs at 4.5 and 13 years. Heterotypic stability from 1 to 13 years was partially or fully mediated by the same constructs at 4.5 years.

Conclusions—Maternal behaviors showed a pattern of homotypic and heterotypic stability, whereas dyadic behaviors were somewhat less stable. Child behaviors showed evidence of both homotypic and heterotypic instability.

INTRODUCTION

Developmental psychologists have extensively studied and theorized about developmental continuity, stability, and change (e.g., Cairns, 1979; Caspi, Roberts, & Shiner, 2005). Studies of the stability of parent-child interactions have included investigations of discipline (Gershoff, 2002), responsiveness (Bornstein, Tamis-LeMonda, Hahn, & Haynes, 2008), and sensitivity (Dallaire & Weinraub, 2005; NICHD Early Child Care Research Network, 1999, 2003). Most have tended to focus on mother-child interactions in particular and have been limited to the developmental stages of infancy and early childhood. The current longitudinal study examined stability in the mother-child relationship in infancy, early childhood, and adolescence. We use the term stability to refer to consistency in rank over time and examine both homotypic (i.e., consistency of similar behaviors) and heterotypic (i.e., consistency of different behaviors reflecting a similar underlying trait) forms.

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Most studies examining homotypic and heterotypic stability in parent-child interactions have used self-report measures, which tend to show higher stability than observational measures (Holden & Miller, 1999). For example, Loeber and colleagues (2000) reported high heterotypic stability in family interactions from ages 6 to 18 years, based on reports from both the child and the primary caregiver. McGue et al. (2005) found evidence of moderate homotypic stability in the parent-child relationship based on perceptions reported by the child from ages 11 to 14. Among studies using observational measures, Fagot and Gauvain (1997) reported significant heterotypic stability in maternal scaffolding behaviors from 18 to 30 months, and Howes et al. (1998) found heterotypic stability from attachment security in infancy to child perceptions of mother-child relationship quality at 9 years.

We examined the evidence for homotypic stability in mother-child interactions from infancy to early childhood, and for heterotypic stability in mother-child interactions from infancy and early childhood to adolescence, using age-appropriate and developmentally salient structured problem-solving tasks that allow the mother and child to work together. Based on previous findings of greater stability in observations of maternal behaviors than in child behaviors (e.g., Kochanska & Aksan, 2004; NICHD Early Child Care Research Network, 1999, 2003; Weinfield et al., 2002), we predicted larger effects in maternal behavior qualities than in child or dyadic behavior qualities.

METHOD

Participants

Participants were 202 children (100 girls, 102 boys) and their mothers. Mother-child dyads were observed at three points in time: 1, 4.5, and 13 years. Families were part of a larger ongoing longitudinal project, the Wisconsin Study of Families and Work (WSFW; Hyde et al., 1995). Fifty-seven percent of the children were first-born and 43% were second- or laterborn. Most (90.6%) of the children were White/non-Hispanic, 7.9% were multiracial, 1% were Black/non-Hispanic, and 0.5% were Indian/Alaskan Native. Mothers' education averaged 5.3 (SD = 1.6) on a scale from 1 (< high school) to 8 (graduate degree). Average reported household income at study recruitment was $35,000–49,999. The mean age of the mothers at child age 1 year was 30.6 years, ranging from 21 to 42 years. All mothers used English as their first language or spoke and read it well enough to complete questionnaires and interviews in English.

Procedures

Infancy and early childhood—The Parent-Child Early Relational Assessment (PCERA; Clark, 1985, 1999; Clark et al., 1997, 2004) measured the quality of the mother-child relationship at 1 and 4.5 years. The PCERA assesses clinically salient dimensions of the parent-child relationship, including aspects of parental affect and behavior that contribute to healthy emotional, social, and cognitive child development, as well as aspects that put a child's development at risk (Clark, 1999). After completing a 30-min interview with a research assistant, mother-child dyads were videotaped in their homes for 15 min, composed of 3 consecutive 5-min segments. Segments included, in order, a feeding, a structured task (a block design task), and free play. The structured task was used in the current analyses because of its similarity to the task used at 13 years.

Videotapes were coded by graduate students who were blind to our hypotheses. Coders received 40 hours of training by the second author and rated pilot tapes during the training period. The PCERA was coded for 65 items that were rated on a 5-point scale. Scores of 1 to 2 indicate an area of concern, 3 an area of some concern, and 4 to 5 an area of strength. Thus, higher scores indicate higher quality interactions on all items and composite scales

(including on negatively named scales and items, such as maternal negative affect or dyadic tension). Eight composite scales were constructed from the items, including three maternal scales, three child scales, and two dyadic scales. These scales are described in Table 1. Scale values are the means of included items. Mean percentage categorical agreement between pairs of raters on all items following training was 84%; mean $\kappa = .68$. Clark (1999) described PCERA development and construction in detail.

Adolescence—To assess the quality of the mother-child relationship in adolescence, the Mother-Child Interaction Rating Scales (MCIRS; Owen, 2009) was used with behavioral observations of a structured task that was administered in the family's home during the summer following the child's 7th grade year. After completing 30-min interviews and questionnaires individually, mother-child dyads were videotaped for a 15-min mathematics homework task in which the child completed a math assessment and the mother helped her child work a series of challenging mathematics problems (Else-Quest et al., 2008). The initial 5-min teaching component of that task is the focus of the MCIRS because it was the best opportunity for mothers to scaffold the problem-solving for their children. The MCIRS was adapted from the Parent-Child Interaction Scales (Owen et al., 2000; NICHD Early Child Care Research Network, 2008) and the Age 15 Parent-Adolescent Interaction Coding System (Owen et al., 2007) used in the NICHD Study of Early Child Care and Youth Development and, like the PCERA, contains scales representing maternal, child, and dyadic elements of the interactions. The MCIRS includes 3 maternal scales, 4 child scales, and 1 dyadic scale, rated from 1 (very low) to 7 (very high). In Table 1, these scales are described and presented adjacent to the conceptually equivalent PCERA scales used at 1 and 4.5 years.

Coders were blind to our hypotheses and received more than 50 hours of training, which included coding pilot videos. All videos were coded independently by two coders; discrepancies between coders were discussed and resolved by consensus. Consensus codes were used in the data analyses and have higher validity than individual raters' codes (Uebersax, 1988). Mean percentage categorical agreement between pairs of raters on all items following training was 63% (87% within one level); mean $\kappa = .28$. However, because these data do not meet the kappa assumption of a random distribution, kappa likely underestimates interrater consistency (Uebersax, 1988).

RESULTS

To assess homotypic stability from infancy to early childhood, we conducted hierarchical multiple regressions between each of the 8 maternal, child, and dyadic PCERA composite scales at 1 and 4.5 years. We controlled for the effects of maternal education and age and child birth-order and gender by including them in the first step of each of the regression models. Demographic variables did not produce a significant change in R^2 ($p > .05$) except for the model assessing maternal positive affect; $R^2 = .08$; $F(4, 197) = 4.54$, $p < .01$. Table 2 shows model statistics and regression coefficients for the second step, which included the PCERA scales from 1 year. All significant effects were in the hypothesized direction and were small ($f^2 = .02$) or medium ($f^2 = .15$; Cohen, 1988). Maternal and dyadic, but not child, affect and qualities were stable from infancy to early childhood.

We ran hierarchical multiple regressions to assess heterotypic stability in mother-child interactions from infancy and through adolescence. When two scales from one measure corresponded to one scale from the other measure, the two scales were summed (see Table 1). Demographic variables entered in Step 1 did not produce a significant change in R^2 ($p > .05$) in any model. Table 3 shows model statistics and regression coefficients for Step 2 (PCERA scales at 1 year) and Step 3 (PCERA scales at 4.5 years). Both positive and negative qualities of maternal and dyadic ratings of parenting behavior and affect, but not

child ratings, in mother-child interactions display some degree of heterotypic stability from infancy to early childhood and adolescence. Standardized regression coefficients for 1-year PCERA maternal and dyadic scales decreased, and in some cases became nonsignificant, in Step 3, consistent with at least partial mediation (Baron & Kenny, 1986). That is, mother-child relationship quality at 4.5 years partially or fully mediated the stability in maternal and dyadic scales from 1 to 13 years.

DISCUSSION

Our findings provide evidence of homotypic and heterotypic stability in the quality of mother-child interactions from infancy to early childhood and adolescence. Mothers who were more responsive and engaged and less negative in their interactions during infancy and early childhood displayed more responsiveness, engagement, and warmth, and less hostility during adolescence. Dyads who displayed intersubjectivity and synchrony-related behaviors such as mutuality and reciprocity during infancy generally continued to do so in early childhood and adolescence. As predicted, child behavior qualities demonstrated the least evidence of either form of stability compared to maternal behavior qualities. Maternal behavior qualities may be more consistent over time, given that they are associated with personality, attitudinal, and contextual factors that are homotypically stable (Belsky & Jaffe, 2006), and because the rate of change and development is more rapid during childhood than during adulthood (Weinfield et al., 2002). Nonetheless, mother-child interactions are dynamic and bidirectional, and the plasticity of child behaviors requires that sensitive mothers be flexible in their specific behaviors and interactive styles and demonstrate a high degree of intersubjectivity. The stability of the dyadic relationship depends much on the stability of the mother's behavior, which can serve to regulate the dyadic relationship as the child's behavior fluctuates across development.

The small-to-medium effects in the current study are comparable in magnitude to those reported by others (e.g., Fagot & Gauvain, 1997) and should be considered in light of reports that behavioral observations of parent-child interactions tend to show smaller test-retest correlations than do self-report measures (Holden & Miller, 1999). Using only one 5-min observation may underestimate of the degree of homotypic and heterotypic stability in these interactions, in that stability estimates for maternal behaviors are higher when observations are longer in duration (Holden & Miller, 1999).

Although our sample is diverse in terms of the mothers' educational attainment and income, over 90% of the mothers are European American, and 88% of the dyads come from dual-parent households; thus, we are cautious in generalizing these findings to other groups. Nevertheless, when we controlled for the potential effects of demographic variables, relationships still showed both forms of stability.

The results of the current study suggest that the mother-child relationship is neither immutable nor discontinuous over time. Rather, it appears that some elements of the relationship are more plastic; maternal behaviors displayed homotypic and heterotypic stability across the three assessments, yet child behaviors generally did not. These findings are particularly relevant to family therapists and social workers, as well as school and community psychologists, who may desire to modify or shape parental behaviors to improve outcomes for children, parents, and families. The parent-child relationship is often a fundamental component of the treatment of disturbances in childhood. Yet, insofar as maternal behaviors are fairly stable and resistant to change, efforts to improve maternal behaviors may be most fruitful when targeted at new mothers, or mothers with a very young child, before habitually negative or maladaptive patterns develop.

Our findings follow logically from the meta-analytic conclusions of Holden and Miller (1999), who characterized childrearing practices as "enduring and different." This study demonstrates that maternal behavior qualities are especially enduring, even into adolescence, when child affect and behavior are changing.

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TABLE 1

Description and Correspondence Between Theoretically and Conceptually Equivalent Scales on Rating Systems from Infancy/Early Childhood (PCERA) and Adolescence (MCIRS)

PCERA- ages 1 and 4.5 years	MCIRS – age 13 years
Maternal Scales	
Positive affective involvement, sensitivity, & scaffolding: enthusiastic mood, visual contact, sensitivity and responsivity to child's cues, social initiative, structuring and mediating of the environment, and quality of verbalizations	Supportive presence[a]: Positive regard, emotional support, engagement/ involvement in task, positive tone of voice Valuing & warmth[a]: positive facial expression and tone of voice, positive verbal and nonverbal communication, affection toward child
Negative affect & behavior: angry, hostile mood & tone of voice, displeasure toward child	Hostility: Angry, rejecting, negative tone of voice, negative physical touch
Anxiety & intrusiveness: intrusiveness, rigidity, anxious or hypomanic mood, negative physical contact	Respect for child's autonomy: [low scoring mothers display] intrusiveness, engagement in power struggle, forcefulness, controlling
Child Scales	
Positive affect, communicative, & social skills: alertness, exploratory play, expressed positive affect, and visual contact	Agency[b]: Confidence, positive affect, enjoyment & participation in task Affection toward parent[b]: Positive regard, verbal/physical affection, shared positive affect
Quality of play, interest, & attentional skills: persistence, attentional abilities, alertness, self-regulation	Persistence: task involvement & engagement, attentiveness
Dysregulation & irritability: anxiety, impulsivity, aggressivity, as well as consolability and soothability	Negative affect[c]—Externalizing: Anger, hostility, frustration, oppositional defiance Negative affect[c]—Internalizing: Sadness, sorrow, withdrawal
Dyadic Scales	
Mutuality & reciprocity[d]: enthusiasm and reciprocity Tension[d]: joint attention and activity, as well as state dissimilarity	Affective mutuality: Emotional exchange and reciprocity, positive regard, open verbal and nonverbal communication, warm and harmonious

Note. Scale scores are based on the mean of items. Higher scores on all PCERA scales indicate higher quality interactions; higher scores on MCIRS scales indicate a higher degree of the construct rated. Scales with matching superscripts were summed for analyses of heterotypic stability.

TABLE 2

Homotypic Stability in Mother-Child Relationship from Infancy to Early Childhood

		Step 2: 1 y PCERA			
Outcome: 4.5-year PCERA		**R^2**	**f^2**	**b**	***F* (1, 196)**
Maternal	Positive affective involvement, sensitivity, & scaffolding	0.16	0.19	.29**	17.58**
	Negative affect & behavior	0.04	0.04	.18*	6.30*
	Anxiety & intrusiveness	0.06	0.06	.23**	10.19**
Child	Positive affect, communicative, & social skills	0.02	0.02	0.13	3.21
	Quality of play, interest, & attentional skills	0.01	0.01	0.02	0.07
	Dysregulation & irritability	0.02	0.02	0.08	1.10
Dyadic	Mutuality & reciprocity	0.08	0.09	.21**	8.93**
	Tension	0.06	0.06	.20**	8.18**

Note. Step 1 included demographic variables (maternal education and age, and child birth-order and gender).

* $p < .05$.

** $p < .01$.

TABLE 3

Heterotypic Stability in Mother-Child Interactions from Infancy and Early Childhood to Adolescence

		Step 2: 1-year PCERA				Step 3: 4.5-year PCERA			
Outcome: 13-year MCIRS		**R^2**	**f^2**	**b**	***F* (5, 196)**	**R^2**	**f^2**	**b**	***F* (6, 195)**
Maternal	Supportive presence; Valuing & warmth	0.07	0.08	0.22 ***a*	2.63 *	0.10	0.09	0.19 *	3.58 **
	Hostility	0.03	0.03	−0.15 **a*	1.41	0.03	0.02	−0.08	1.16
	Respect for child's autonomy	0.06	0.06	0.14 **b*	2.56 *	0.09	0.11	0.19 **	3.36 **
Child	Agency; Affection	0.04	0.04	0.06	1.51	0.08	0.09	0.21 **	2.76 *
	Persistence	0.01	0.01	−0.04	0.30	0.03	0.03	0.14 *	0.92
	Negative affect	0.01	0.01	−0.06	0.41	0.01	0.01	−0.03	0.37
Dyadic	Affective mutuality	0.05	0.05	0.16 **b*	2.18	0.12	0.13	0.27 **	4.44 **

Note. Step 1 included demographic variables (maternal education and age, and child birth-order and gender). Higher scores on all PCERA scales indicate higher quality interactions, and higher scores on MCIRS represent a higher degree of the construct rated.

[a] Effect decreased but remained significant in Step 3.

[b] Effect decreased and became nonsignificant in Step 3.

* $p < .05$.

** $p < .01$.