

Part IV

MEASUREMENT

PROOF

PROOF

CHAPTER 26

Parenting Behavior as the Environment Where Children Grow

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Parenting behavior is not only the feature that defines the evolution of mammals and the component of parenting shared across mammalian species – it is the only aspect of the parenting phenomenon available to the infant. Following birth, both the parent’s physiology and the parent’s mindset are available to the infant only through the filter of the parent’s relational behavior. As such, it can be argued that parenting *is* behavior – or repeatedly executed sets of specific behaviors of varying goals, rhythms, intensities, frequencies, and durations. Because of (OK) the critical importance of such behaviors for infant growth, survival, and well-being, the “parenting behavior” constellation consists of a highly conserved species-specific repertoire that may be more restricted and biologically based during the first postpartum period and gains richness, culture-specificity, flexibility, and individual variations as children grow. This early set of parenting behavior provides the foundation for the parent-infant bond, considered as the cornerstone of children’s biological, cognitive, social, and emotional development (Feldman, 2007a; Leckman et al., 2004).

Ethological models, beginning with the seminal work of Lorenz (1950) and adapted to the study of human development by Bowlby (1969) and his followers, were the first to highlight the parent-infant bond as the central determinant of growth and maturation and advocated a behavioral, bottom-up approach to the study of bond formation. Bonding, according to these models, is expressed in a specific set of behaviors that emerge or intensify during periods of bond formation and such behaviors should be meticulously documented as a prerequisite for theory building. This behavior-focused perspective reorganized thinking in the field of infant development, especially with regards to the role of parenting behavior in the formulation of developmental theory. According to theoretical models derived from Ethology, observing the behaviors parents exhibit toward their young during the period of bond formation may provide the best entry point into the science of parenting and, consequently, into the study of human development.

Among the central questions in the conceptualization of parenting as an area

of inquiry is: how are parenting behaviors “internalized” and become a part of the infant’s mind, body, and behavior. Rutter and Sroufe (2000) argue that the central question for the study of social-emotional development in the next millennium should be: how do relational patterns experienced in infancy turn into the child’s stable personality orientations across the lifespan. This question taps one of the central issues in development – the transformation from objective behavior into subjective mental content, from the interpersonal arena into the intrapsychic sphere, and from momentary parental behaviors to stable child competencies. Every theory of social-emotional growth, including attachment theory (Bowlby, 1969), psychoanalytic object-relations theory (Winnicott, 1956), and theories of socialization (Maccoby, 1992) and morality (Hoffman, 2000), is guided by the underlying assumption that the child’s stable personality orientations – in terms of his sense of security in the world, the capacity for empathy, the development of emotion regulation, and the ability to accept societal rules and acquire a moral code – draw on the infant’s earliest relationship with the parents. These repeated behavioral patterns and their long-term effects have been variously termed as “internal working model” (Bowlby, 1969), theorized as mental structures based on repeated experiences of maternal sensitivity across infancy, or “RIG – repeated interactions that have been generalized” (Stern, 1995), formulated as abstracted relational schemas that shape the child’s emergent self. Psychoanalytic theories of human development have similarly proposed that development is based on the internalization of actual relationships experienced in infancy, beginning with Freud’s (1916–1917) position on personality growth as emanating from a series of structural transformations in the infant’s relationships with the mother, Kohut’s (1971) emphasis on the role of repeatedly experienced maternal empathy for the consolidation of the self, Loewald’s (1960) formulations on mother-infant ongoing attunement as the origins of the individual’s internalizations,

and Winnicott’s (1956) conceptualization of the “holding environment” as a framework of predictable maternal actions that provides the foundation for the child’s creativity, authenticity, and the use of complex symbols throughout life.

The long-term effects of early parenting behavior on the development of personality echoes the dilemma that baffled philosophers since Plato – how do objective, quantifiable, and observable events turn into subjective experiences, the “stuff” of mind and personality, and what is the interface between the subjectively experienced inner world and external reality. Recent neurobiological models on self and consciousness have similarly grappled with the unexplainable gap between the third person objective assessment of consciousness – the specific brain structures, circuits, and neurons that support the conscious mind, and the first person phenomenological experience of subjectivity and individuality (Damasio, 2003; Edelman, 2004). The central hypothesis being proposed in this chapter is that parenting behavior, in particular the measurable “objective” experience coconstructed between parent and child during social interactions, variously termed as “reciprocity,” “coregulation,” “attunement,” “mutual-influence,” or “synchrony,” provides a terminal station for the transformation of objective events into subjective experiences that support the formation of personality traits. This prototypical experience forms the interface where the parent’s physiology, mental representations, affective state, and social networks are integrated into a specific parenting behavioral style; the infant’s physiology, emerging mental world, and relational matrix is integrated into the child’s behavioral style; and the behavioral patterns of the interacting partners shape each other in a reciprocal manner. Only through this interface of mutually influencing behaviors can the parent’s physiology and representational world begin to have an impact on the child’s mind and behavior and begin to provide the building blocks for the child’s stable competencies, internal representations, well-being, and emotional growth. The

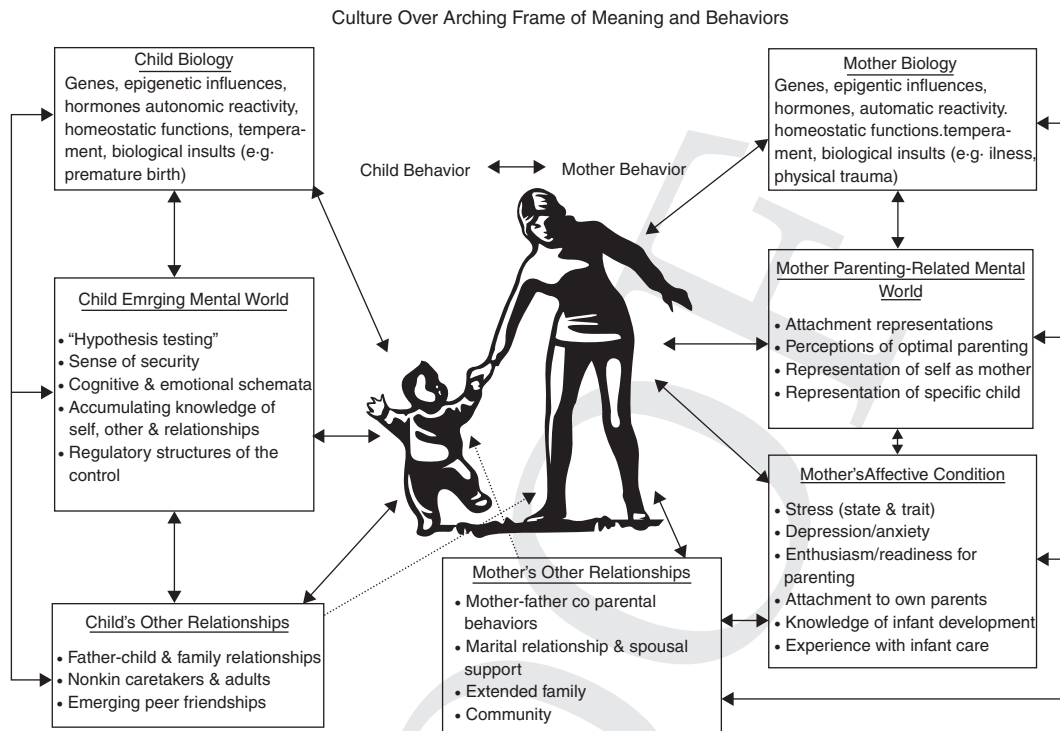


Figure 26.1. Parenting behavior as the interface of mutual influences between parent and child as reciprocally related to physiological, mental, affective, and contextual conditions.

proposed theoretical model is presented in Figure 26.1.

As seen in Figure 26.1, the central interface highlighted in the model is the mother-infant relational exchange. The term “mother” (rather than parent) is used to emphasize the associations of human parental behavior to its mammalian heritage and the absence of paternal care for 97 percent of species, but similar processes may be proposed for fathers (studies of both maternal and paternal behavior are detailed later). Maternal behavior is shaped by the mother’s physiology, mental world, affective condition, and matrix of relationships and feeds back and reorganizes these components. In the same way, the infant’s behavior is reciprocally connected to the child’s biological dispositions, emerging mental structures, and other relationships. The only avenue by which maternal biology, affective state, and mental world can have a direct impact on the child’s biological systems and internal representations is through

the central interface where the mother’s behavior continuously remodels the infant’s behavior and is reciprocally reorganized by it. The model contains one exception for a direct impact on the infant’s behavior that is not by means of the mother-infant behavioral exchange – the mother-father coparental behavior, the father-child and family relational patterns, and the sibling relationship, all of which are behavioral components. According to theories of socialization (Asher & Gottman, 1981; Baumrind, 1973; Dunn, 1991; Hartup, 1989; Parke & Bhavnagri, 1989; Schneider, Attilit, Nadel, & Weissberg, 1989), children’s social behavior is shaped by two contextual mechanisms: participation and observation. “Participation” refers to the shaping of social behavior through ongoing interactions in which the child is a participant and “observation” considers the direct impact of interparental or interfamily interaction patterns on child behavior in settings where the child is an observer of repeated interactions between significant

others (Feldman, Masalha, & Derdikman-Eiron, 2010). The model still maintains, however, that only parental behavior can have a direct impact on infant behavior through repeated exchanges and the effects of the parent's physiology and representations on the child's biological systems and mental world must pass through the interface of actual events experienced during interpersonal relatedness (Feldman, 2007b). The model also emphasizes that relational exchanges and their mutual effects on physiology and representations occur within the general framework of the cultural meaning systems and general philosophies. These cultural schemas organize the definition of the self, dictate the notions of optimal parenting, and determine the parent's overarching goals in socializing children (Feldman & Masalha, 2007).

Considering the centrality of behavior in the development of children, it is thus of critical importance to form a language and develop systematic scientific tools for the observation of parenting behavior that would be valid across ages, cultures, and interacting adults; differentiate healthy from pathological development; and monitor the effects of intervention. For several decades, researchers have been searching for scientific ways to categorize parenting behavior, especially during the first year of life. The goal of these studies was to capture the parent's "sensitive," "responsive," and "mutually adaptive" style that is conducive for the infant's social-emotional growth and to define deviations from this optimal style in various forms of psychopathology. Studies have typically observed mother-infant free interactions (or less often father-infant interactions) at home or in a laboratory setting to assess the natural parental style that provides the "environment" for infant development. Two types of coding have been applied to address aspects of parenting behavior, microanalytic codes or global rating scales. Microanalytic coding includes a set of discrete behaviors, such as parent gaze at infant, "motherese" vocalizations, parental touch, or facial expressions, and the appearance of each behavior is marked for every small segment of time

and tallied across the entire interaction as frequencies (number of time a behavior occurred, for instance, number of time the parent touched the infant affectionately) or proportions (percentage of time out of the entire interaction this behavior was "on," for instance, proportion of time the parent expressed positive affect). Rating scales, on the other hand, were coded for the entire session on a Likert scale, often address more global aspects of the interaction, and may be more evaluative of the quality of the interaction, using constructs such as responsiveness, intrusiveness, or reciprocity. Such global scales follow the tradition of Ainsworth and colleagues (1978) and their use of global rating of maternal sensitivity, the key feature of the environment that promotes the infant's attachment security.

In this chapter, one global observational system of parent-child relationship is described in detail – the Coding Interactive Behavior – CIB (Feldman, 1998) as a window to the study of parenting behavior from infancy to adolescence. The CIB was developed more than a decade ago and has since been used in multiple studies of typically developing and high-risk samples ranging in age from newborns to adults and across a variety of cultures. In the following, the system is described, beginning with formulating the language for an observational system of parent-child interactions, continuing with the theoretical and methodological requirements of such a system, and concluding with the results of studies conducted with the system in different ages, pathological conditions, and cultural backgrounds. Associations between specific relational behaviors and specific components of the model – parent and child's physiology, representations, and social relationships – are presented to provide support for the proposed model. Longitudinal studies attesting to the stability of the parent and child's relational behavior and its prediction to stable components of the child's personality, adaptive behavior, and competence are presented using follow-up studies from infancy to adolescence. Results of these studies shed light on the development of parenting

behavior as the environment where children grow and may begin to address the central question of social-emotional growth posed by Rutter and Sroufe (2000) – how do early relational patterns transform into stable personality orientations.

I. Formulating the Language for a Behavior Observation System

As a first step to formulating a system of behavior observation, one must define the main theoretically based constructs that are central to every human interaction. Such constructs provide the vectors against which the behaviors of specific social partners are evaluated and must tap the stable components of the individual and the dyadic interactive style. Relational constructs used should be broad enough to describe social interactions at every age, culture, and pathological condition yet specific enough as to not render the coding meaningless.

The CIB system is used to evaluate “free play” interactions between adults and children (or discussion sessions between adults and older children and adolescents or between romantic partners) and has been used for children from the newborn stage and up to adolescence, with a new version now available for interactions between romantic partners. The system contains 45 rating scales; 22 address the adult’s behavior, 16 evaluate the child’s behavior, five are dyadic codes, and two are overall codes, and codes are aggregated into several theoretically based constructs. Additional codes are available when the context is not that of free play, such as feeding, caregiving, cognitive problem-solving tasks, or book reading. A separate coding scheme is used when more than two people are interacting, typically a family, and this scheme evaluates the functioning of the family as a single unit. The CIB system uses global rating scales on a 5-point Likert scale and each code and the coding is not (apart from the newborn period) a time-sampling microlevel assessment of discrete behaviors. Yet, the system requires attention to various details, to multiple aspects of the

interaction, and to the specific behaviors of each partner as well as to the ongoing patterns of the relational unit.

The Architecture of Social Interactions

In the assessment of parenting behavior, the architecture of human relational behavior needs to be considered along three main lines: the level of observation, the target of observation, and the structure of observation, and each is discussed in turn.

- a. *Level of observation.* The CIB system uses multiple discrete scales, which are first coded and then summarized into higher-order constructs. The system maintains both the discrete scales and the global constructs in order to enable different levels of observation that may be used to answer specific empirical questions and to assess how multiple aspects of behavior cohere into higher-order constructs under different conditions, such as age, culture, or pathology.
- b. *Target of observation.* Most prior research on mother-infant interaction focused on the behavior of the mother, probably due to attachment theory’s focus on maternal contributions to development. The CIB system considers behavior at both the level of individuals and the level of the interacting dyad or triad. The target of the analysis, therefore, first examines the separate behaviors of each individual (adult and child). Following, the target of the analysis shifts from the behaviors of each partner to the behaviors of the interacting dyad and the coding then addresses the organizational features of the dyadic system (Feldman, 2007c). In cases when interactions occur between more than two people – typically mother, father, and child or an entire family – the target of observation shifts again from individuals and dyads to the family system as a whole, consistent with perspectives on the development of family systems (Minuchin, 1985; Davies & Cicchetti, 2004). These shifting targets enable the researcher to

consider the unique vectors that may be important for individuals during social action, for relational dyads during interpersonal exchanges, and for entire relational systems during interactions in order to capture the meaningful dimensions of social systems at each level of functioning.

- c. *Structure of observation.* Every interaction consists of components that describe its “content” and components that describe its “form.” Content refers to specific relational behaviors of each partner, for instance “parent positive affect,” or “child vocalizations.” These codes are based on discrete behaviors that always appear in a certain way, assess behaviors within a specific modality, and can be easily evaluated on the basis of the frequency and duration of their appearance. Codes related to form typically consider more subtle and fundamental aspects of the interaction, such as “parent intrusiveness,” “child initiation,” or “dyadic reciprocity.” These codes may appear in various modalities, their level often depends on the response of the partner (e.g., certain maternal behaviors can be experienced as intrusive by some children but not by others), and their role is to describe the underlying organization of the interaction as it unfolds.

The CIB independent codes are aggregated into eight higher-order constructs. These constructs are based on theory and research in the field of early social development. The three adult constructs are sensitivity, intrusiveness, and limit-setting; the three child constructs are engagement-involvement, withdrawal, and compliance; and the two dyadic constructs are dyadic reciprocity and dyadic negative states. Additional codes and constructs are available for specific themes that appear in the child’s play, for the level of the child’s symbolic play, for feeding interactions, and for maternal and child negative affect and these constructs may be used in certain samples based on the research question. Each construct is built on a mixture of codes related

to “content” and codes related to “form.” Similarly, each construct includes codes that are considered to be central for this construct at any age or culture and codes that may be part of the construct at some points in development but not in others or in some cultural settings but not in others. For instance, “parent acknowledgement” is a fundamental component of the “parent sensitivity” construct in any interaction at any age, whereas “parent affectionate touch” may be a more salient component of sensitivity in some cultures and the “parent imitation” code is a component of the sensitivity construct in the first months of life, but not thereafter.

Assessing Developmental Process

The social behavior of infants and young children changes dramatically during the first years of life: from the newborn’s scant moments of attention, to the young infant’s nonverbal involvement, to the preschooler’s construction of complex play scenarios, to the older child and adolescent’s complex verbal outputs. Parenting behavior, therefore, contains components that are meaningful across ages and codes that are specific to, or become salient at a certain time-window and serve a specific developmental goal during that period. For instance, during the 3- to 6-month stage, parents tend to move and manipulate the infant’s arms and feet, rock the infant to and from a sitting position, or throw the baby in the air. These arousing forms of touch stimulate the child’s physiological systems and create coherence between various nonverbal channels of communication, such as positive affect, vocalizations, gaze, and touch (Ferber, Feldman, & Makhul, 2008). During mother-child interactions in Western societies these patterns decrease significantly over the second six months of life, and in cases when physical manipulation is observed beyond the first year one should consider disturbances in the relationship. Yet, during father-child interactions, physical manipulation and “rough-and-tumble” play may be observed across the toddler and preschool years and even beyond, and the high father-

child physical engagement is thought to promote the father-child bond (Lamb, 1977; Yogman, 1981). Similarly, in more traditional societies, father-child physical manipulation is the culturally accepted mode of relatedness, particularly with sons. For instance, father physical manipulation and “intrusive” behavior across the infant and toddler stages was found to predict *higher* child social competence at the childcare setting among Palestinian children, whereas similar intrusive patterns predicted *lower* social competence in Israeli toddlers (Feldman & Masalha, 2010), indicating that the growth-promoting components in one culture can be counterproductive in another.

Similar to differences related to cultural settings and interacting adults, there are parental behavior that may not be observed before a certain age. For instance, behaviors related to child compliance and parental limit setting, to joint attention, and to child on-task persistence are first observed toward the end of the first year and gain meaning as important vectors of the parent and child’s social behavior only during the second year. Codes addressing the child’s creative-symbolic play or competent use of the environment are likely to become meaningful aspect of the interaction during the second year of life, along with the maturation of symbols and the consolidation of intentional action (Bates, O’Connell, & Shore, 1987; Kagan, 1981; Messer, 1994). In this respect, the division of parenting behavior into codes that describe “content” and those that describe “form” may be useful. While the “content” of the interaction may change across development, in terms of the appearance or disappearance of specific behaviors along the maturation of cognitive, motor, and social skills, the organizational features of the interaction, the codes describing its “form,” are likely to be meaningful across development, although levels of specific formal features may change with age. For instance, following the trajectory of the maternal sensitivity construct at six time points from birth to five years, it was found that sensitivity showed a curvilinear trajectory, with rapid increases during the first half-year, a decrease thereafter, and a plateau

from two to five years of age (Feldman & Eidelman, 2009a).

In assessing parenting behavior as children’s “environment,” it may be useful to consider relational behaviors along five stages of social development from the newborn stage to adolescence, and examine the unique repertoire of parent and child’s social behavior at each stage.

- a. *The socially oriented newborn and the maternal postpartum repertoire.* The first post-partum month (or six weeks) is a unique period of “bio-behavioral transition” (Emde, Gaensbauer, & Harmon, 1976), when the newborn’s homeostatic and self-regulatory functions and cycles of predictable caregiving start to consolidate (Sander, 1984). At this stage, infants are beginning to orient to the social world. Consistent with the work on maternal behavior in mammals (Meaney, 2001) and theoretical perspectives on bond formation (Leckman et al., 2005), parent-newborn observations should focus on the unfolding of the species-specific behaviors that support the parent-infant bond. At this stage, the CIB has a unique microlevel coding scheme that uses a time-sampling approach to assess parenting behaviors typical of the human mother in the postpartum period, including different forms of affectionate and functional touch, types of vocalizations, affective expressions, and gaze direction, as well as the infant state and gaze. Of the typical CIB rating scales, the only ones applicable for this age are maternal adaptation, maternal intrusiveness, maternal positive affect, and infant alertness. Feeding interactions begin to take shape as a central context for the emerging mother-infant bond and serve an important function for the development of the feeding relationship and the CIB system for newborn has a special version for feeding interactions that also consider the robustness of infant feeding and the nature of the mother’s feeding behavior (Silberstein et al., 2009a).

- b. *The relational infant.* Between the ages of three and twelve months, beginning with the emergence of face-to-face communication and up to the first signs of symbol use, infants are at the most social phase in life (Stern, 1985). Relational patterns in various modalities, such as gaze, affect, voice, touch, proximity position, body orientation, and arousal indicators, consolidate into configurations of dyad-specific behaviors, and parent and child begin to adapt to each other's pace and rhythms (Feldman, 2007a). Specific behaviors become markers of social interactions at this stage. Parents express positive affect and continuous gaze, emit "motherese" high-pitched vocalizations, acknowledge and elaborate the infant's signals in various interactive modalities, and engage in reciprocal ritualistic games. At the same time, parents develop a range of affective expressions, become resourceful in handling the child's changing mood and needs, and form a consistent style of relatedness. Infants show concrete social behaviors, such as gaze at the parent's face, social vocalizations, signs of positive affect, alertness and exuberance, and early forms of affectionate touch. During the second six months infants begin to initiate social interactions and the dyadic interacting style is marked by reciprocity, mutual adaptation, and a "dance-like" fluency and rhythm. These early face-to-face patterns are critical for the formation of the social brain circuitry (Johnson et al., 2005) and were found to predict a range of positive outcomes, including the development of self-regulation, symbolic skills, and empathy (Feldman, 2007a). Similarly, pathological conditions – whether stemming from the mother (e.g., postpartum depression), the infant (e.g., prematurity), or the context (e.g., poverty, war-related trauma) – are expressed in specific disruptions to the dyadic exchange at this stage.
- c. *The just-verbal toddler.* With the development of symbol use and language (Nelson, 1985) and the child's emerging moral development at the second year (Kagan, 1984), parent-child interactions continue to show the positive indicators of social behavior observed in infancy, although face-to-face interactions are typically replaced by joint attention and manipulation of objects. These two emerging abilities – symbol formation and self-regulation – are expressed in new components of play. Toddlers begin to use elements of their environment for play, typically toys and objects, and the manner, complexity, and creativity of their use of the environment's offering is an important marker of their social and cognitive skills (Feldman, 2007d; Slade, 1987). At the same time, parents begin to socialize children to accepted social norms and interactions become more focused on the Dos and Don'ts of moral development (Emde, Biringen, Clyman, & Oppenheim, 1991). New parental behaviors related to limit setting and the child's willing compliance to the parental commands become markers of development in the social and moral domains. Other perspectives (Erikson, 1963; Patterson, Littman, & Bricker, 1967) highlight child autonomy as the central developmental milestone for the toddler stage and elements of the child's behavior, captured in codes such as "child initiation" and "child reliance on parent for help" mark the degree to which the child's social engagement is internally motivated and autonomous as opposed to being reliant and dependent. During the toddler stage, feeding interactions becomes an important context for the development of the parent-child relationship that may support or interfere with the child's emerging autonomy (Chatoor, 2000). Special feeding behaviors such as "negotiation during feeding" and "independent feeding" are important aspects of the feeding relationship and describe the development of autonomous feeding (Feldman, Keren, Gross-Rozval, & Tyano, 2004).

d. *The symbolic preschooler* From three to six years, play interactions develop markedly and the elements first noted at the toddler's play in their rudimentary form become more rich and complex, including creativity and symbolic expression, autonomy and initiation, compliance and self-regulation. In the preschool years, observational contexts other than free play may be used to index the parent-child relationship and its support of various developmental goals, such as a book-reading, a puppet show, or problem solving. With the development of the child's "internal state talk" (Bretherton & Beeghly, 1982) and theory-of-mind abilities, children become engaged in creating complex symbolic scenarios. In contrast to the toddler stage, when the coding focused on the complexity of the child's symbolic expression as a marker of development (Feldman, 2007d), in the play of preschoolers, coding the degree of complexity and creativity is complemented by a detailed assessment of the specific themes children enact during free play. Assessing these play themes may help shed light on the child's inner world of fantasy and guide diagnosis and treatment. In the preschool stage, the CIB has an additional appendix, which addresses typical themes that appear in the play of preschoolers, such as care and nurturance, construction and fixing, aggression, or adventure and travel. Play themes are coded for the frequency and intensity of their appearance and for whether they were initiated by the parent or child. Other behavioral elements that consolidate during the preschool years relate to the child's attention and affect. During this stage, play sessions become longer and enable the observer to focus on topics related to emotions and emotion regulation: Is the child able to maintain on-task persistence or does he/she give up easily? Does the child's mood remain positive, negative, or alternate between energy and lethargy, engagement and disengagement?

Such observations may serve as early markers of later attention difficulties. Consistent with Erikson's (1963) view on the importance of initiation at the preschool years, the parent's handling of the child's independent action is an important parenting behavior that colors the child's rearing environment at this stage, and codes such as "parent praising" and "parent criticizing" index the parent's appreciation or devaluation of the child's initiatives. Finally, as preschoolers begin to develop close peer friendships and to form independent relationships with parents and peers, it is important to differentiate the child's general affective expression during the observation from the affect directed to the parent. The distinction between codes such as "child positive affect," which assesses the child's global affect, and "child affection to parent" can serve as a specific marker of the attachment relationship at this stage.

e. *The verbal-empathetic child.* During the school years, especially as children grow older, parent-child interactions no longer revolve around the parent and child's free play with toys. In studies of older children, two settings have been used for assessing the parent-child and whole-family interactions; a problem-solving or goal-directed activity (e.g., puzzle, joint drawing, art-work) and a joint discussion session on a pre-selected topic. For discussion sessions, dyads are either asked to choose a common conflict between them and try to reach a solution, or engage in a "positive" discussion and plan an enjoyable joint activity or remember a positive shared event. The coding of these discussions maintains the basic affective non-verbal codes ("content" codes) addressing the following specific social behaviors: Are partners comfortably gazing at each other or are they avoiding gaze? Is the overall affect warm and accepting? Is the vocal quality clear and warm? etc. Similarly, the original codes related to "form" are applicable in these

contexts: Does parent acknowledge the child's viewpoint, position, plans, or memories? What is the level of child initiation of adaptable solution to conflicts? Can the dyadic atmosphere be described as reciprocal and fluent or as tense and constricted? Additional important codes created specifically for the conflict and positive discussions consider the parent's and child's capacity for empathetic resonance, which at this stage become central markers of the parenting environment. These markers of empathy, on the parts of both parent and child, chart the child's rearing environment as empathetic, involved, and facilitating of the child's individuality or as critical, harsh, or careless. During the discussion of conflicts it is important to evaluate the degree of perspective taking and empathic understanding: Is one partner "blaming" or "putting down" the other? Can parent and child see each other's point of view and show empathy to the needs of the other party despite inconvenience to the self? Is the style of discussion rational, practical, or emotional? At this age, children are expected to show empathy to the needs of others, including their parents. Data show that parents and school-age children typically discuss conflicts related to the child's responsibility for his/her room, clothes, pets, homework, or leisure rather than those being the responsibility of the parent and it would be expected of the child to show some acknowledgement of the parent's point of view. The degree of empathy the child expresses toward the parent's position becomes an important marker of the interaction and was found to predictor of the child's social and moral development in adolescence (Feldman, 2007e).

f. *The perspective-taking adolescent.* Two major developments occurring during adolescence are expressed in the types of social interactions adolescents create with their parents; the consolidation of and struggle for autonomy and identity

formation, and the development of perspective taking, higher forms of empathy, and moral internalization. The conflict and positive discussions are used with adolescents as well. Additional codes at this stage include empathy and perspective taking, autonomy taking (child) and autonomy granting (parent), and child's manner of expressing his/her point of view. Dyadic codes address the dyad's assuming responsibility for raising appropriate solutions, the ability to flexibly move between the two positions and between present state, past experience, and future plans, and the dyadic readiness to tackle conflicts versus the tendency to gloss over conflicts or suppress them. Several studies of whole-families interactions with adolescents used goal-directed activities, such as build a kite from a kit, a problem-solving game, use a checkerboard for placing oneself in relation to other family members, and the family CIB codes consider the degree of family autonomy and intrusiveness, involvement, cooperation, activity level, didacticness, creativity, and affective expression.

g. *The affectionate romantic partner.* In assessing the dialogue between romantic partners, three contexts are often used: conflict discussion, positive discussion, and support providing, a setting in which one partner discusses a difficult moment and the other is expected to provide support. Consistent with the central hypothesis guiding theories of adult attachment (e.g., Shaver & Mikulincer, 2002) – that the early parent-child relationship provides the internal working model upon which the individual's intimate relationships are founded – romantic relationships are coded along the same vectors as those of the parent-infant relationship. Nonverbal patterns related to specific modalities, including gaze, affect, and touch, as well as to the individual's general relational style, for instance, acknowledgement, appropriate range or affect, and consistency of style, take

a new angle in contexts where interactions evolve between equals and not between parent and child. The degree of support provided by partners echo the “parent supportive presence” code of infancy, which is based on Winnicott’s (1956) “holding environment,” and the empathy and perspective taking assessment resemble the empathy required of adolescence in negotiating differences with their parents. Overall, the evaluation of romantic partners supports the attachment perspective (Bowlby, 1969) and indicates that the system’s central constructs: sensitivity, intrusiveness, engagement, withdrawal, reciprocity, and tension are meaningful vectors against which social interactions between close partners can be assessed across the lifespan. Important to note in this context that all codes added across development as markers of the child’s socio-cognitive maturation, do not take the place of the basic non-verbal elements observed in infancy: mutual gaze, positive and relaxed affective expression, warm vocal quality, proximity and body orientation, and fluent, natural fluctuations of arousal. These nonverbal patterns provide the “basso continuo” of interpersonal relationships learned in infancy upon which more complex social behaviors can be added as children grow and social interactions become more complex and multi-layered (Feldman, 2007b).

Distinguishing Normative from Pathological Interactions

Behavior observations of the child’s interactions with the primary caregiver are a central component of the diagnostic process in infancy and early childhood (Lieberman & Van Horn, 2008). During the first years of life, systematic observations of relational behavior may be the only tool available to the clinician for collecting direct information on the infant’s emotional state that is not filtered by the mother’s perspective. Observing the preverbal infant, therefore,

may be the only access into the infant’s emerging “internal working model” and his or her hypotheses regarding the social world – whether it is secure, threatening, overstimulating, or uninvolved. At the toddler and preschool stages, direct observations may provide an important “port of entry” (Stern, 1995) into the child’s emerging symbolic world, fantasy content, and increasingly complex relationships with the parents around issues of autonomy, compliance, self-regulation, and affect organization that are not available to the child’s consciousness and cannot be reported by young children. Including systematic behavior observations into the clinical diagnosis of young children not only provides information that is otherwise unavailable, but can be used to guide the formulation of diagnostic classification systems and to differentiate transitory difficulties from stable pathological conditions that merit intervention (Feldman, 2008; Feldman & Keren, 2004).

In formulating the language for distinguishing normative from pathological interactions, an observation system must first determine the appropriate range of behaviors in normative processes across ages as a metric for evaluating deviation. Following, the system should chart specific profiles of the parent and child’s relational behavior under specific risk conditions. Such relational profiles may be important not only for the diagnostic process, but can also serve as the basis for intervention and can be used to evaluate treatment outcomes. Furthermore, understanding the specific relational disruptions under each pathological condition may be an important step in theory building and can provide a deeper understanding of the various pathological conditions and their differential origins, lead to further conceptualizations in the field of developmental psychopathology, and advance progress in the study of developmental process as a whole.

Interactions between parents and children with a wide range of psychopathological conditions have been studied using the CIB system and conditions for which results are available are reported later. High risk

conditions utilizing the CIB may be broadly divided into four groups; (a) *Conditions related to child biological risk* – includes cases in which the dyadic relatedness may be disrupted by the child's biologically based condition, such as prematurity, multiple birth (twins and triplets), intrauterine growth retardation, neurological conditions, physical disability (e.g., blindness, cerebral palsy), genetic syndromes (williams syndrome, velocardiofacial syndrome), mental retardation, and autism. (b) *Conditions related to child social-emotional risk* – children with a variety of psychiatric diagnoses but with no known physiological condition, including sleep and feeding disorders, affective disorders, regulatory disorders, PTSD, attachment disorders, and conduct disorders. (c) *Conditions related to maternal psychological risk* – includes cases in which mothers suffer a clinical or subclinical psychiatric condition, such as a major depressive disorder or high level of depressive symptoms, anxiety disorder or high level of anxious symptoms, PTSD, or personality disorders. (d) *Conditions of high contextual risk* – includes cases of high poverty and community violence, war-related trauma, maternal substance abuse, domestic violence, mothers in a sheltered settings, and incarcerated mothers. Because relationships function as systems, interactions are expected to be disturbed whether the risk is stemming from the parent, the child, or the context (Belsky, 1984; Sameroff, 1995). Furthermore, because of the systemic nature of development, the question of whether one can talk of the infant's own disorder apart from disordered early relationships and even from a disordered community is a matter of ongoing debate (Harris, Lieberman, & Marans, 2007).

In specifying the behavioral repertoire of each pathological condition, several points are of theoretical and clinical importance. First, research is still needed to determine whether each pathological condition exhibits a unique relational profile or whether conditions within each group (e.g., infant biological risk, maternal affective disorder, contextual risk) present a similar clinical picture. Second, possibly, for differential

diagnosis the use of individual codes (e.g., "acknowledgement") may be more informative than the higher-order constructs ("sensitivity"). Third, in some clinical conditions the relational profile points to *deficit* in the amounts and frequencies of positive parental behavior, for instance in cases of maternal postpartum depression; in others the relational profile is that of *negative parenting*, expressed in higher parental negative behavior (e.g., "criticizing," "parental hostility"), and in yet others the profile may be that of appropriate amounts of parental behavior that are not suited to the infant's signals, as observed, for instance, between parents and triplets. Assessing the specific disruptions to early relational behavior may therefore illuminate the nature of the condition and can serve to guide specific intervention. Finally, the developmental trajectories of parent and child's social behavior in each pathological condition should be assessed in the study of normative and disrupted relational processes. Whereas the deviations from normative social development decreases for some conditions, for instance among low-risk premature infants born to families of low social risk, the risk for other conditions may increase with age, for instance, the effects of maternal postpartum depression on the child's social engagement increased between two and five years (Feldman & Eidelman, 2009a). Because there is nearly no data on the development of relational patterns in different pathological conditions, assessing the trajectories of social behavior under various risk conditions requires much further research. Such data may be highly informative for a comprehensive understanding of the specific risk to infant development in conditions stemming from child biological conditions, parental psychopathology, or contextual risk.

Finally, another indicator for the disruptions to children's social-emotional development may be tapped by comparing the child's interaction with the mother to interactions with other adults. For instance, Field (1992) found that infants of depressed mothers interact in a "depressed" way even with nondepressed adults, indicating

an internalization and generalization of a depressed mode of relatedness. Conversely, using the CIB system, it was found that when mothers are depressed and fathers are emotionally stable, infants of depressed mothers show more optimal interactive behaviors with their father (Feldman, 2007c). Comparing the two interactions in cases of maternal depression may describe the degree to which the relationship with the mother has been generalized to other social relationships (e.g., Stern's RIG) or whether other experiences available to the child enable the differentiation of depressed and nondepressed social partners. Among infants and young children with PTSD following exposure to war and violence, a greater difference between the interaction with mother and with a stranger was found as compared to controls. Infants with posttraumatic symptoms were significantly more frightened and withdrawn and showed lower engagement during play with a stranger compared to the mother, pointing to a basic mistrust of unknown adults that develops with repeated exposure to trauma (Feldman & Vengrober, 2011; Feldman, Vangrober, & Hallaq, 2007). On the other hand, children with Williams' syndrome displayed the opposite pattern. Whereas most children favor interactions with the mother and show more reciprocity and engagement with the attachment figure, these children prefer interactions with novel partners and show higher engagement, positive affect, attention, and vocalizations to the stranger. Thus, comparing interactions with mother and father or mother and stranger in under various risk conditions may illuminate the nature of the child's attachment relationship and its exclusivity. Such analyses can trace the internalizations from the child's multiple social relationships and how these various internal models cohere to form the stable social "personality" or interactive style.

Evaluating Change Following Intervention

A behavior observation system that is directed toward the diagnosis of infant

disorders must be sensitive to the effects of intervention. The central goal of intervention efforts in the early years – whether through various modes of parent-infant psychotherapy, psychoeducational programs, or home visitation, or by affording increased maternal-infant touch and contact – is to enhance the mother-infant bond. Such interventions all work on the assumption that a stronger bond and a greater parental investment would enhance the child's physiological, cognitive, social, emotional, and self-regulatory skills. Consistent with the theoretical model, the observation system should be able to detect changes in the mother's mental representations of parenting or physiological readiness for bonding by observing her concrete social behavior. In this respect, the system can help specify the effects of each intervention on specific pathological condition by using its own language. For instance, by using the distinctions between the level, target, and structure of observation, one can assess whether the intervention had an effect on specific relational codes or on the higher-order constructs (level of observation); whether the intervention had a greater impact on the behavior of mother, of child, or of the interacting dyad (target of observation); and whether the impact of the intervention was stronger on specific components of the dyadic exchange – the content – or on its formal features (structure of observation).

In addition to using the system to evaluate change in relational behavior following intervention, the system itself can be used in the *process* of intervention. Psychotherapeutic interventions for mothers and young infants are often directed to help mothers understand their infant's nonverbal communications and respond appropriately while at the same time understanding the emotional reasons for their interactive style and how it was shaped by their experiences as young children (Lieberman, Silverman, & Pawl, 2000). The codes of the CIB system can therefore be used to help mothers understand early interactions: What is considered "sensitive" parenting and how it is expressed by concrete maternal behavior?

What is intrusiveness and how she may be interfering with the child's flow of behavior? How can one reach reciprocity? At the same time, mothers can be introduced to children's social behavior; how does the child express engagement and withdrawal at each age, when is compliance appropriate and when it turn into reliance that interferes with the development of initiative and autonomy, and what are the specific ways infants signal overload (e.g., gaze aversion) or desire for more social stimulation (e.g., body orientation). Clinicians have often use video feedback to show mothers their videotaped interactions, pointing to moments of coordination and episodes of "miss," and attempting through these microlevel relational moments to enter into the mother's mental world and internalized behavioral style (Feldman & Keren, 2004). The language of the observation system, therefore, may provide a language for the therapeutic process, expanding the mother's ability to detect, respond, and monitor nonverbal social signals in herself and the child and understand their importance for the emerging relationship.

Psychometric Properties of the CIB System

Adequate psychometric properties are a basic requirement of any scientific tool. For a systematic collection of information, the observation system's psychometric properties must fulfill several conditions. In the following, these are detailed in relation to the CIB system.

(a) *Test-retest reliability.* In multiple samples of normative and high-risk populations and across ages, medium-to-high test-retest reliability is observed for the system's constructs. This is found for mother-child interactions in numerous contexts, such as play and feeding (Feldman, Keren et al., 2004; Keren & Feldman, 2002; Keren, Feldman, & Tyano, 2001; Silberstein et al., 2009b), or face-to-face and toy exploration (Feldman, Greenbaum, Mayes, & Erlich, 1997). Similarly test-retest reliability is found

between the child's interactions with different partners; between mothers and fathers in both infancy (Feldman, 2000; Feldman, Weller, Sirota, & Eidelman, 2003; Feldman, 2007c) and the preschool years (Geller, Diesendruck, & Feldman, 2007); between mothers, fathers, and caregivers (Feldman & Klein, 2003); and between mothers and strangers (Feldman, Vangrober, & Hallaq, 2007). In multiple longitudinal studies, coded independently by different observers, stability is found across time for the CIB constructs (Feldman, Eidelman, & Rotenberg, 2004; Feldman & Eidelman, 2005; 2006), with several studies showing stability across six time-points from birth to five years (Feldman & Eidelman, 2009a), and six time points from 3 months to 13 years (Feldman, 2010). Stability was also found for the CIB feeding codes from the newborn period to the end of the first year (Silberstein et al., 2009b). Similarly, stability was observed across cultures, following Israeli and Palestinian mothers, fathers, and infants from 5 months to 3 years (Feldman & Masalha, 2010). These studies demonstrate that the CIB constructs capture meaningful components of the individual's relational style, which are stable over lengthy periods of time as coded blindly by coders unfamiliar with the person's behavior at a previous time-point.

(b) *Construct validity.* The CIB constructs are theoretically based. Yet, in every sample studied so far, the same codes aggregated into the same higher-order constructs with adequate internal consistency. This was found across ages and in samples from different cultures. Each construct contains several codes that are considered the "core codes" and load on this construct in any observations and codes that may be more dependent on age and culture. For instance, affectionate touch is part of the "maternal sensitivity" construct in some culture but not in others, whereas "mother acknowledgment of child's communication" is a

core feature of the sensitivity construct at any age and an item-to-total analysis demonstrated that this code has the highest loading on the sensitivity construct in several samples. Finally, to validate the CIB constructs, we conducted a confirmatory factor analysis for 483 interactions. Results confirmed the four expected constructs; a positive and negative construct for the parent (sensitivity and intrusiveness) and a positive and negative construct for the child (social involvement and negative engagement), $X^2 = 56.12$, $p = .18$, goodness-of-fit-index (GFI) = .94, adjusted goodness-of-fit-index (AGFI) = .93, normed fit index (NFI) = .92, root mean square error of approximation (RMSEA) = .03.

- (c) *Relations to other coding schemes.* An additional aspect of the “construct validity” of the system relates to its underlying theoretical definition. In several studies the CIB codes are made with other theoretically related coding schemes where both coding schemes were used for the same interactions by independent coders. Theoretically based associations were found between related constructs of the two systems. For instance, correlations were found between the CIB “reciprocity” construct and synchrony assessed by micro-analytic coding (Moshe & Feldman, 2006; Harel, 2006), and between reciprocity and synchrony assessed with the “Monadic Phases” system (Tronick, Als, & Brazelton, 1980). Associations were also found between the CIB constructs and the Observing Medial Interaction system (OMI, Klein, 1996), a coding scheme for parents’ teaching behavior during interactions with toddlers (Klein & Feldman, 2007). Similarly, in comparing the Alarm Distress Baby Scale (Guedeney & Fermanian, 2001), a system that detects early signs of child withdrawal as a precursor to pediatric depression, correlations were found between withdrawal behavior assessed with the Alarm Distress Baby scale during a visit to the pediatrician and the

CIB constructs of child involvement and withdrawal (Dollberg, Feldman, Keren, & Guedeney, 2006).

- (d) *Predictive validity.* Finally, an important feature of an observation system that focuses on the first year of life is its ability to predict long-term outcomes in various developmental domains and the child’s general well-being. Relational behaviors assessed with the CIB in the first year of life were found to predict IQ, behavior problems, symbolic complexity, self-regulation, social competence at a childcare setting, and empathy and peer friendship across childhood and up to adolescence (Feldman, 2007e; Feldman & Blatt, 1996; Feldman, Eidelman, & Rotenberg, 2004; Feldman & Eidelman, 2009a; Feldman & Masalha, 2010) as well as to differentiate between adjusted and less-adjusted adolescents at age thirteen (Feldman, 2010).

As seen, the CIB system demonstrates the psychometric requirements of an observation system and predicts to meaningful dimensions of child development. The multiple studies currently conducted using the CIB in the United States, France, Germany, United Kingdom, Belgium, Brazil, Italy, and Holland would provide further validation of the system across cultures and emerging data support its universal applicability. Cross-cultural studies would further specify the CIB and help tease apart the universal and stable components from the culture-specific application.

II. Findings: What Have We Learned from Observing Parent-Child Interactive Behavior

Studies have typically addressed the associations between observed relational behavior and components of the theoretical model – mother and child’s physiology, mother’s mental representations, child temperament, the child’s mental world, mother and child’s affective condition, and the relational matrix of the dyad. In the following, findings are

presented for normative and pathological conditions and for intervention outcomes.

Normative Processes from Birth to Adolescence: Developmental Change, Correlates, and Prediction

Newborn stage. The infant's first social experience is marked by a unique repertoire of maternal behavior, including maternal gaze at the infant's face and body, "motherese" high-pitched vocalization, expression of positive affect, adaptation to infant cues, and affectionate touch – a behavior akin to the licking-and-grooming of mammals, and typical mothers naturally engage in such behaviors immediately after birth. This early encounter marks the infant's first experience in social contingencies. Infants engage in alert states for approximately 15 percent of the interaction and mothers were found to provide 65 percent of their behavior during these scant moments of alertness, establishing the infant's first experience of coordination between internal state and maternal behavior (Feldman & Eidelman, 2007). These maternal behaviors serve an important function for infant growth, and the amount of maternal postpartum behavior has shown to predict infant-mother and infant-father synchrony at 3 months, neurobehavioral maturation at 6 months, cognitive and symbolic development at 1 year, and IQ and child social development at 5 years (Feldman & Eidelman, 2003, 2007, 2009; Feldman, Eidelman, & Rotenberg, 2004), highlighting the centrality of early maternal behavior for the infant's physical, emotional, and cognitive growth.

Maternal postpartum behavior is shaped by maternal and infant physiology. In a longitudinal study, mothers were followed at three time-points: first trimester of pregnancy, last trimester, and first postpartum month. Plasma oxytocin and cortisol were sampled at each time-point. Following birth, mothers were interviewed with regards to infant-related thoughts and worries and were observed interacting with their infants. Maternal oxytocin levels across this period were highly stable and levels at first

trimester predicted the amount of maternal postpartum behavior, particularly affectionate touch, and its coordination with infant state (Feldman, Zagoory-Sharon, Weller, & Levine, 2007), suggesting that affiliative hormones during pregnancy function to prime mothers to the initiation of bonding, similar to their role in other mammals (Insel & Young, 2001). A second study evaluating mothers' and fathers' oxytocin levels in the postpartum in relation to parenting behavior found that oxytocin correlated with the parent-specific repertoire: with affectionate touch, "motherese," and positive affect in mothers, and with stimulatory touch and object presentation in fathers (Gordon et al., 2010). Maternal behavior is shaped by the infant's physiological systems as well and was predicted by the newborn's cardiac vagal tone (Feldman & Eidelman, 2007), a measure of infant autonomic maturity that provides the foundation for social engagement (Porges, 2003). Maternal postpartum interactive behavior was also predicted by the mother's perception of labor pain – a psycho-physiological dimension of pain resilience. In particular, mothers with a tendency to "catastrophize" painful experiences reported labor as intensely painful and were less sensitive toward their infants at six weeks of age (Goldstein-Ferber & Feldman, 2005).

Infancy. Substantial changes occur across the first year of life in parents' and infants' interactive behavior. In comparison with the first months of face-to-face interactions, during the second six months of life, parents and infants begin to jointly attend and manipulate toys and, with the development of intersubjectivity (Trevarthen & Aitken, 1999), higher levels of reciprocity are observed and infants show higher involvement and initiation of joint activities. Between four and eight months infants' initiation show a marked increase and mothers' perception of infant intentionality grows accordingly. At eight months, mothers perceive their infants as intentional, goal-directed creatures who can selectively express emotions and purposefully attempt to achieve a goal (Feldman & Reznick, 1996).

Although individual stability is reported for maternal and infant behavior in all samples, interactive behaviors change in a dynamic fashion in relation to change in proximal and distal conditions. For instance, positive changes in interactive behavior between 3 and 9 months, that is, an increase in maternal sensitivity and infant social engagement and a decrease in maternal intrusiveness, were related to a decrease in maternal anxiety symptoms and an increase in father involvement, highlighting the ongoing dependence of interactive behavior on the constant fluctuations of individual and contextual determinants (Feldman et al., 1997). Similarly, the development of dyadic reciprocity across the first year was found to parallel the development of maternal touch patterns. Assessing infants at 3, 6, 9, and 12 months, affectionate touch decreased during the second six months while the level of dyadic reciprocity increased. The amount of early affectionate touch predicted the level of dyadic reciprocity in later infancy, pointing to the mother-infant loving physical contact as a foundation for the development of intersubjectivity (Goldstein-Ferber et al., 2008).

Father-infant patterns in the first year differ from the patterns observed between mothers and children mostly in factors related to "content" and less in factors related to "form." Overall, no differences were found in parent sensitivity or in infant social engagement between infant-mother and infant-father interactions at five months, although specific codes showed some differences. For instance, more physical manipulation, a quicker tempo of the interaction, and higher peaks of positive arousal were found for fathers, whereas more affectionate touch, longer episodes of social gaze, and more covocalization emerged for mothers (Feldman, 2003). Father involvement in childcare responsibilities, in terms of the amount and range of childcare activities the father undertakes (e.g., feeding, diapering, bathing, physician visits, taking for walks), predicted the degree of child social involvement during interactions with father, and both maternal and paternal sensitivity were

related to the level of their marital satisfaction (Feldman, 2000), findings which support ecological models on the determinants of parenting (Belsky, 1984).

Toddler stage. Several studies examined typically developing children between 1 and 3 years, focusing on the emerging competencies of toddlers. Two-year olds were observed interacting with their mothers, fathers, and caregivers in order to assess individual stability in the child's social relatedness with the three meaningful adults and to examine the specific relational styles of each interaction. Overall, interactions between the three adults were individually stable, underscoring the child's contribution to the interaction even with non-kin adults. No differences were found in sensitivity among the three adults, but children showed the highest level of engagement with mother and the lowest with caregiver. Similarly, caregivers exhibited the highest level of limit setting in terms of a consistent style that maintained children on task. The parents' and caregivers' childrearing philosophies predicted the nature of their interaction as did the caregivers' style in interacting with the entire group of children (Feldman & Klein, 2003).

Another study with two-to-three year olds addressed the relations between the mother's mental representations and the mother and child's relational patterns. Mothers were interviewed with the Parenting Developmental Interview (PDI, Aber, Belsky, Slade, & Crnic, K., 1999), a narrative instrument that assesses the mother's state of mind with regards to attachment and her representations of self as a parent, the relationship with her own parents, and the representations of the specific child. Mothers whose representations were marked by more positive features, such as higher expression of joy, a more coherent narrative, less anger and guilt, and higher sense of parental competence, engaged in more positive interactions with their toddlers. These toddlers were also better able to regulate their emotions as observed in settings that required the regulation of frustration and joy (Dollberg, Feldman, & Keren, 2010; Feldman, Dollberg & Nadam, 2011).

Finally, a cross-cultural study of Israeli and Palestinian families, observed from 5 months to 3 years revealed that relational patterns in both infancy and the toddler stage were predictive of children's social competence, self-regulation, and aggressive behavior at the childcare setting. These findings indicate that relational behavior within the family context provide the foundation for the child's functioning within society at the stage when children make their first steps from the family microsystem into the larger social world (Feldman, Masalha, & Alony, 2006; Feldman & Masalha, 2010).

Preschool. The maturation of the child's theory of mind, complex symbolic play, and peer friendships requires support from the parent-child relationship. Assessing 3–4 year olds interacting with their mother, father, and the family, it was found that although the degree of sensitivity or the complexity of the child's symbolic play with mother and father were similar, children engaged in different play themes with each parent. Children expressed more "care" themes with mother, such as feeding, bathing, or dressing, and more "construction and fixing" and "travel" themes with father, and these parent-related themes were particularly notable in same-gender pairs: father-son and mother-daughter (Keren, Feldman, Namdari-Weinbaum, Spitzer, & Tyano, 2005). Similar to the findings that parent-infant synchrony is greater in gender-matched pairs (Feldman, 2003) and that the level of symbolic complexity is higher in gender-matched dyads (Feldman, 2007d), the symbolic content of children's play appears to be shaped not only by the parent's gender but also by the gender matching and mismatching status of the interacting dyad, with same-gender pairs possibly capitalizing on biologically based tendencies of both partners. Parent-child interactions were found to be predicted by child IQ and the quality of the marital relationships, pointing to the links between individual and contextual determinants and observed interactive behavior at the preschool stage.

In both infancy and the toddler stage, mother-child relationship is shaped by the

mother's representations of both herself as a parent and the specific child. During the preschool years children's representations of their parents begin to have a more substantial contribution to the interaction. In a recent study of preschoolers, the child's internal representations of the parent were assessed among children aged 3.5 to 6.5 years. Children provided free narratives to ten TAT-like cards that depicted daily situations between parents and preschoolers. Several cards showed child with mother, others child with father, and yet others child with both parents (e.g., mother walking into a messy room and finds child sitting on floor and playing; mother, father, and child strolling pleasantly in the park). Children were then videotaped interacting separately with mother and father (Geller, Diesendruck, & Feldman, 2007). A developmental progression in children's social behavior was observed from 3 to 6 years, which differed for mother and father. Reciprocity and child engagement increased over time in both mother-child and father-child interactions, however, intrusiveness and withdrawal decreased with age only in mother-child interactions. These findings highlight the different developmental trajectories of children's relationship with each parent and point to the need to investigate interactions with each parent across childhood as contributors to the child's representational world. Children who perceived their parents as warmer, more nurturing, and less angry also engaged in more optimal interactions with these parents, in terms of higher reciprocity and social engagement, supporting the proposed links between the child's emerging mental representations of attachment relationships and actual behavioral patterns. The parent-specific patterns were associated with parent-specific representations, which point to the emerging specificity of the child's internal working models at both the behavioral and mental levels. Yet, the contribution of these specific behaviors and representations to long-term outcome requires much further research.

Adolescence. Several studies followed groups of healthy children from infancy to

adolescence, periodically assessing parent-infant interactive patterns. In the first study, children were followed at six time-points from infancy to adolescence: at 3 and 9 months and at 2, 4, 6, and 13 years (Feldman, 2007e, 2010) and mother-child interactions were observed at each visit. Parent Sensitivity, Child Engagement, Parent Intrusiveness, and Dyadic Reciprocity were each found to follow a unique trajectory over time and often curvilinear trajectories were charted. Maternal sensitivity increased across the first year, then decreased and stayed at a medium level until adolescence, while reciprocity increased steadily until age 6 and decreased somewhat between childhood and adolescence. Relational patterns were individually stable from one observation to the next and the averaged level of maternal sensitivity and dyadic reciprocity across the entire period predicted children's depressive symptoms and behavior adaptation at 13 years (Feldman, 2010). In a second study, infants were observed at 5 months and 3 years with mothers, father, and the family and were then observed interacting with mother, father, the family triad, and their best friend at 13 years (Bamberger & Feldman, 2011). Results demonstrate stability in dyadic reciprocity across time – infancy to adolescence – as well as across partners: mother, father, and friend. Similar to the findings for newborns, the child's reciprocal relationship with friend was related to physiological support systems that enable social engagement and was predicted by cardiac vagal tone and the vagal brake. Reciprocity with mother and father across infancy predicted the child's ability to engage in a reciprocal, empathetic dialogue with a best friend in adolescence, indicating that the infant's first experiences with the attachment figures shapes the child's relationships with significant others at the point when peers take over the parents' position in being the adolescent's main target of closeness and intimacy. These longitudinal patterns from infancy to adolescence lend support the central hypothesis underlying theories of social-emotional growth: that early interactive patterns experienced

within attachment relationships shape the child's life-long patterns with close friends and intimate partners.

Family patterns. During the first months of life, family patterns consolidate and the family context begins to emerge as a unique interactive setting, particularly at the transition to parenthood when couples become families (Cowan & Cowan, 1992). At the transition to parenthood, parents who were better able to balance the conflicting demands of work and family following the mother's return to work from maternity leave engaged in more optimal family relational patterns, in terms of higher family cohesion and lower family rigidity (Feldman, Masalha, & Nadam, 2001). Family cohesion and rigidity are two higher-order constructs used by the CIB system to depict the family atmosphere. Cohesion describes the warm family, where individuals are autonomous and involved, play is creative, family members express positive affect, and the general atmosphere is that of collaboration and cooperation. Family rigidity indexes the "enmeshed" family, where members compete for attention, autonomy of each individual is discouraged, and the atmosphere is didactic and tense. These family patterns were found to be stable from infancy to the toddler stage and to predict children's social competence in the childcare setting (Feldman & Masalha, 2010). Family interactions, like dyadic relationships, appear to be characterized by distinct patterns that are stable across time and context. As family interactions provide the child's first experience in a "group" setting, these repeatedly experienced patterns are likely to be internalized and contribute to the child's working model of functioning in social groups.

In terms of symbolic content, assessment of 3-year olds playing with mother, father, and the family triad showed that the level of symbolic complexity and the richness of thematic content was significantly higher during parent-child interactions as compared to play (Keren et al., 2005). Possibly, navigating multiperson social systems, ability observed in infants already at the first months of life (Gordon & Feldman, 2008),

requires significantly more effort from the child and may tax the resources available for complex symbolic expression. In general, family interactions provide an important context for the study of social development and should be evaluated from a cross-cultural perspective (Feldman, Masalha, & Alony, 2006) as families represent the smallest cultural “institution” that function to transmit cultural values, meaning systems, and relational behavior to the next generation. Family interactions also provide an important context to assess how the behaviors of individuals and the relationships between dyads within the family cohere into a higher-order process. Because of the role family interactions play in the development of children’s well-being (Fincham, 1998), understanding the ways in which family-level processes support or undermine emotional growth may shed further light on the links between early social experiences and later social competencies.

Relational Patterns from Birth to Childhood: Developmental Psychopathology

Risk conditions to infant development have generally been divided along the lines of biological and social-emotional risks. In the following, findings are presented for the two types of risks and follow the developmental line of each from the newborn stage to later childhood.

BIOLOGICAL RISK

Prematurity. Premature birth is the most frequent biological risk condition in the industrial world, affecting 7–10 percent of births in Western societies. Technological advances enable smaller and smaller infants to survive each decade, yet much research has pointed to the high risk for cognitive and neurological disorders among these children and substantial difficulties to the development of early attachment. Several studies using the CIB focused on premature infants. In the neonatal period, mothers who were able to better resolve the trauma of premature birth, use the nursing staff for practical and emotional

assistance, deal with their anxiety and guilt, and feel more competent in the parental role upon discharge from the hospital also showed more positive maternal behavior, in terms of gaze, affect, adaptation, and affectionate touch, and their infants were more alert and less withdrawn (Keren, Feldman, Sirota, Eidelman, & Lester, 2003).

The effect of breastfeeding on the mother-preterm interaction and later development was examined in three groups of mothers of premature infants, according to the amount of breast-milk mothers expressed for the infant to feed (in a bottle): those who provided minimal (< 25 percent of infant nutrition), intermediate (25–75 percent), and substantial (> 75 percent) amounts of breast-milk. Mothers who provided substantial amounts of breast-milk reported less depressive symptoms and engaged in more maternal behavior, particularly affectionate touch. These findings are consistent with a neuroendocrinological model on the development of parenting behavior (Carter, 1998). Breastfeeding is likely to increase maternal oxytocin levels and its ensuing initiation of maternal behavior in typical mothers, however, the initiation of bonding is likely to be disrupted following premature birth which precludes full bodily contact and natural nursing (Feldman, Weller, Leckman, Kvint, & Eidelman, 1999). Since similar levels of oxytocin increase are reported for breast-pumping and natural breastfeeding (Zinaman, Hughes, Queenan, Labobok, & Albertson, 1992), it is possible that breast-feeding among mothers of preterm infants helped to initiate the disrupted feedback loop of the oxytocin system. The degree of maternal behavior was found to predict the infant’s neurological and cognitive development at six months and infants who were mainly breastfed showed better developmental outcome (Feldman & Eidelman, 2003).

Assessing feeding interactions between mothers and low-risk premature infants in the hospital using the CIB coding scheme for newborn feeding, mothers and infants who showed a faster and smoother transition from gavage to oral feeding engaged in more

optimal feeding interactions. These infants showed a more robust sucking pattern during feeding and their mothers were less intrusive and more adaptive to the infant's feeding cues (Silberstein et al., 2009a). At one year of age, these infants were observed during feeding interactions at home, the home environment was assessed, and mothers were interviewed regarding their infants' feeding problems. Difficult feeders at one year, defined according to DC 0-3R criteria as infants showing minimal food consumption, no independent feeding, and engaging in constant struggle during feeding, showed lower reciprocity, engagement, and higher withdrawal and their mothers were less sensitive during feeding interactions at one year. Furthermore, the level of feeding difficulty at one year was predicted by feeding and nonfeeding interactions at the neonatal period, especially maternal affectionate touch during free interactions and maternal gaze aversion during feeding, highlighting the importance of early gaze and touch patterns for the development of the feeding relationship, particularly in the context of biological risk (Silberstein et al., 2009a).

Neonatal cardiac vagal tone and maternal postpartum behavior were examined in preterm and full-term infants as predictors of infant-mother and infant-father synchrony at 3 months. An interaction effect of premature birth and autonomic maturity was found and indicated that preterm infants with low vagal tone received the lowest amounts of maternal behavior in the postpartum and the least maternal affectionate touch at 3 months (Feldman & Eidelman, 2007). These findings are consistent with the "differential susceptibility to rearing conditions" hypothesis (Belsky, 1998). This hypothesis suggests that infants with higher disposition to dysregulation require more attentive parenting yet such infants often receive lower amounts of parental behavior, placing them at even a greater developmental risk.

At three months, the mother's representations, measured with the Parenting Developmental Interview (PDI, Aber et al., 1999), relational behavior, and infant

performance on a visual novelty recognition task and an emotion regulation task were compared between preterm and full-term infants at 3 months of age (Harel et al., 2011). Results showed significant differences in the maternal narrative of attachment to her infant, suggesting fundamental difficulties in the mother's ability to bond with her premature infant. Mothers of premature infants had difficulty describing the infant in idealized terms, experienced guilt and a sense of incompetence as a mother, and often felt "disconnected" from the child. These representations were associated with the typical relational profile between mothers and premature infants – higher maternal intrusiveness, higher infant gaze aversion and withdrawal, lower dyadic reciprocity and adaptation, and higher dyadic tension and negative states. No differences emerged between groups on the visual recognition task but premature infants were less able to modulate their arousal during the emotion regulation task, and lower emotion regulation capacities were related to higher maternal intrusiveness.

Few studies examined interactions between premature infants and their mothers beyond infancy. In a study that followed mother-child relational patterns at six time-points from birth to five years, the trajectories of maternal sensitivity and child social engagement were examined among low-risk premature infants. Mother sensitivity increased from birth to six months, decreased from six to 12 months, and stayed stable from 12 months to five years. Child social engagement increased linearly from birth to five years, with higher increments during the first year and slower increases thereafter. Relational patterns were individually stable across the 5-year period and at all time-points between six months and five years, maternal sensitivity predicted both the child's concurrent IQ and the IQ score measured at the next time-point, highlighting the role of maternal sensitivity in the development of cognitive competencies among premature infants (Feldman & Eidelman, 2009a). However, because this study was conducted on a large cohort of

preterm infants ($N = 125$) and no full-term controls, future research is needed to examine whether similar trajectories of social behavior is observed in full-term dyads.

Finally, in a follow-up of premature infants at 8 time-points from birth to ten years, a complex pattern of interaction emerged between mother-child relational patterns and the child's developmental competencies, particularly in the domains of physiological, emotional, and attentional regulation. Consistent with the transactional model of development (Sameroff, 1995), better emotion regulation capacities at one age predicted more reciprocal interactions at the next stage. Yet, the opposite pattern was also observed and more reciprocal interactions at one age predicted better regulatory capacities at the next step. These findings point to the complex mutual influences between relational patterns and the child's acquisition of regulatory skills and underscore the role of reciprocal exchanges for the aforementioned transformation from external interpersonal experiences to internal traits and phenomenological experiences of subjectivity.

Intrauterine Growth Retardation (IUGR). This condition implies that for some physiological reason the infant did not receive adequate nutrition or was not able to or achieve appropriate growth during pregnancy and was born weighing less than the 10th percentile of the growth curve for his/her gestational age. Studies have shown that IUGR infants are more irritable than those born with appropriate-for-gestation age birthweights, especially if the child is born both prematurely and with IUGR. Following a group of premature IUGR infants from birth to two years in comparison with both birthweight-matched and gestational-age-matched premature controls, it was found that IUGR infants displayed the highest levels of negative emotionality and their social signals were more unclear and inconsistent compared to both control groups. In parallel, mothers of IUGR infants showed the highest levels of intrusive behavior across infancy, marking especially high levels of intrusiveness and infant negative affect as

components of the relational profile of this risk group. Higher maternal intrusiveness, in turn, predicted lower cognitive abilities at 2 years (Feldman & Eidelman, 2006).

Multiple Birth – Triplets. Triplets are the fastest growing birth population in the Western world, yet very few studies examined the development of triplets across the first years of life. In a study following 23 sets of triplets matched to 23 sets of twins and 23 singleton infants from birth to five years. Relational patterns were examined at each time-point. Overall, triplets received lower levels of maternal sensitivity at 6, 12, and 24 months compared to singleton and twins, but differences at five years were no longer significant. Similarly, lower social engagement was found for triplets until 2 years (Feldman & Eidelman, 2005). The relational profile of parents and triplets during infancy was that of the parent providing adequate amounts of parenting behaviors (the “content” codes: gaze, positive affect, vocalizations), but these were not adapted to the child's pace and rhythms. These findings are interpreted in terms of evolutionary models on exclusive parenting as an essential component of the bonding process, which is disrupted when the parent need to bond with three children simultaneously while being overwhelmed with their physical needs (Feldman & Eidelman, 2004). In 62 percent of the triplet sets there was one child who suffered IUGR in addition to being born as part of a triplet set and this child often received the lowest level of sensitive parenting as compared to the siblings. The IUGR child among the triplet set showed poorer cognitive and social-emotional development across childhood and received less sensitive and reciprocal parenting. The findings for triplets highlight the unique ecology of the triplet situation and the limited resources available to parents when faced with the task of raising three infants. As a result, the child who is more medically compromised paradoxically receives less sensitive care, which leads to irreversible negative outcomes, as suggested by the “differential susceptibility” model (Belsky, 1998). A follow up of these triplets at five years indicated

that most triplets showed a developmental catch-up by five years and their cognitive, neuropsychological, and social-emotional development is similar to those of the matched singletons and twins, as is the level of social engagement during interactions. However, the IUGR child among the triplet set remains at a developmental risk and lower cognitive and social-emotional competencies as well as interactive engagement are observed for these children upon school entry (Feldman & Eidelman, 2009b), findings consistent with multirisk models of development.

Prenatal neurological risk. A study in Paris examined maternal representations and the emerging mother-infant relationship in cases when ultrasound examination discovers soft neurological signs in the infant during pregnancy (Viaux et al., 2008). Mothers were followed four times: at second trimester, third trimester, at birth, and at two months postpartum and were compared to controls. Maternal representations were evaluated at each point, infants were checked by pediatricians at birth, and mother-child interaction was observed at 2 months. Mothers of fetuses at neurological risk had narratives that were marked by more constriction, less development and flexibility of the representation, and less differentiation between self and fetus. Interactions between these mothers and their infants were characterized by lower maternal supportive presence, lower joint positive states, and higher joint negative states. Mothers also reported higher anxiety, which tended to increase over time. These findings emphasize the close links between maternal representations and dyadic behavior and highlight the pregnancy period as a critical time for the mother's mental preparation to motherhood and its disruption in cases of perinatal risk.

Genetic Disorders. A study of mother-child relationship in two groups of children with genetic disorders, Williams syndrome and velocardiofacial syndrome (VCF), in comparison with both age-matched and IQ-matched controls describe two distinct, highly stable relational profiles. Among the children with Williams' syndrome, children

showed more relational behavior in terms of the content codes- gaze, affect, touch, vocalization – but were less able to manage a reciprocal dyadic exchange and little maturation was observed in social behavior from early childhood to adolescence. In contrast, children with VCF showed an “autistic-like” social behavior, marked by high social withdrawal, preoccupation with objects, no fluency or reciprocity, and little positive engagement or affection to mother. In both groups, children's social engagement and dyadic reciprocity were related to behavior adaptation and theory-of mind skills, pointing to the links between social behavior, social cognition, and psychological adjustment in cases of high risk (Burg-Malki, Feldman, Diesendruck, Geva, & Gothelf, 2010).

SOCIAL-EMOTIONAL RISK

Two classes of social-emotional risk conditions have been studied using the CIB: risk related to maternal affective condition and risk related to the child's social-emotional difficulties.

Maternal affective disorder. Maternal postpartum depression, affecting 12–15 percent of western women (Burt & Stein, 2002), is a disorder with long-term consequences to the mother-infant relationship and much research has addressed the effects of postpartum depressive symptoms on the mother-infant relationship, mostly during infancy. In several cohorts, associations were found between the mother's depressive symptoms and lower amounts of maternal affectionate touch, and the findings may be related to disruptions in the oxytocin bonding-related system (Feldman, Eidelman, Sirota, & Weller, 2002; Feldman, Keren et al., 2004; Feldman & Eidelman, 2003, 2007). Similarly, maternal postpartum depressive symptoms were related to lower sensitivity, reciprocity, and child engagement and to higher infant withdrawal in both infancy (Feldman, Masalha, & Nadam, 2001; Goldstein-Ferber & Feldman, 2005) and the toddler stage (Feldman, Keren et al., 2004; Dollberg et al., 2006). In the aforementioned study that followed low-risk

premature infants from birth to five years (Feldman & Eidelman, 2009a), infants were divided into four groups on the basis of maternal postpartum depression (high/low) and infant autonomic maturity (high/low cardiac vagal tone) and the trajectories of cognitive development and child social engagement were charted for each group. Infants of postnatally depressed mothers, particularly those with lower cardiac vagal tone, showed the most delayed development in both domains. Interestingly, however, postpartum depression had the most notable effect on children's cognitive and social growth between 2 and 5 years, suggesting that depressed mothers may have a special difficulty in supporting the child's autonomy and emerging separateness and creativity that typically occur during this stage. A study in Germany using the CIB evaluated the relational patterns of 4-month old infants and their postnatally depressed mothers as compared to controls. Results showed that interactions between depressed mothers and their infants were characterized by lower infant social engagement, lower maternal sensitivity, and reduced dyadic reciprocity (Bartling et al., 2006).

Most studies of maternal postpartum depression examined women with high depressive symptoms and much less research assessed mothers diagnosed within a clinical depressive episode. A recent study (Feldman, Granat, Pariente, Kaneti, Kuint, & Gilboa-Schechtman, 2009) recruited a community cohort of 971 women who reported symptoms of depression and anxiety in the second post-birth day and 215 of those at the high and low end were reevaluated at 6 months. At 9 months women with a major depressive disorder ($N = 22$), anxiety disorders ($N = 19$) and matched controls ($N = 59$) were observed in mother-child interaction, in a fear paradigm, and cortisol was collected from mother and child. Infants of depressed mothers showed the poorest outcome on all measures: mothers displayed the lowest sensitivity and infants showed minimal social engagement at play. Infants of depressed mothers showed the highest level of negative affect and the lowest

amount of adaptive regulatory behavior during the emotion regulation paradigm. Finally, infants of depressed mothers had higher baseline cortisol levels and greater cortisol reactivity. Because regulatory capacities are built on the mother's "external regulatory" function in early infancy (Hofer, 1995; Field, 1994), the low capacities of infants of depressed mothers to self-regulate places these infants at a higher risk for regulatory difficulties across the lifespan. Moreover, the disruption to the physiological stress HPA system observed in infancy may point to a permanent damage to the stress response, as observed in animal research (Heim & Nemeroff, 2001).

Maternal anxiety disorder was expressed in a different relational profile, in which the tempo of the interaction was quick and jerky and the infant experienced over-rather than understimulation. The cycle between episodes of gaze synchrony, that is, between moments in which mother and child are looking at each other, was four time longer for depressed mothers and their infants as compared to controls but three time shorter for anxious mothers and their infants (Feldman, Granat, & Gilboa-Schechtman, 2005). The interactive style of anxious mothers was characterized by high intrusiveness and parent-led interactions. Although the amount of maternal behavior in the gaze, vocalization, and positive affect indicators was not lower than controls, these behaviors were not matched to the infant's signals and interactive moments when the infant averted gaze while the mother increased stimulation were often observed. Infants of anxious mothers were less able to regulate frustration, although no differences were found in the regulation of positive emotions.

Among the interesting question arising from the dichotomizing of risk conditions to those originating in the mother and those originating in the child is which risk is greater and carries a more negative impact on the development or early relationship. In a study using a matched-cohort design (Feldman, 2007c), six cohorts of 4-month old infants interacting with their mothers, father, and

in a family triad were compared: a normative cohort, three cohorts of mother-related risk (anxious, depressed, and comorbid anxious and depressed), and two cohorts of infant-related risk (premature and IUGR infants). In all samples fathers were free of anxiety and depressive symptoms and in the infant-related conditions parents were nonsymptomatic. A linear decline pattern was found, with relationships most optimal in the healthy group, less in the mother-risk groups, and the least optimal in the infant-risk group. The relational components most sensitive to risk were parent intrusiveness and dyadic reciprocity, constructs that describe the systemic features of the dyadic relationship and the adaptation of parent and child to each other's rhythms. Family coherence and rigidity similarly showed a linear-decline pattern with most optimal patterns among control families, less among the mother-related risk groups, and lowest among the infant-risk groups. Dyadic and triadic relational patterns were interrelated with maternal and paternal reciprocity related to family cohesion and parental intrusiveness to family rigidity, confirming to the proposed coherence among the various subsystems in the family (Davies & Cicchetti, 2004).

Infant social-emotional risk. Research using the CIB among infants with social-emotional disorders has mainly observed young children referred to an infant mental health clinic who were diagnosed with a variety of psychiatric disorders of infancy. In comparison with nonreferred control families, relational patterns in the clinic-referred group were less optimal on all measures, including lower maternal sensitivity and limit-setting, higher maternal intrusiveness, lower child engagement and dyadic reciprocity, and higher child withdrawal (Keren, Feldman, & Tyano, 2001). The differences between the clinic and control groups increased during feeding interactions. The feeding situation, a setting that elicits more stress and calls for the fulfillment of a life-sustaining maternal function, elicited less adaptive behavior from the clinic children and their mothers and these patterns were

related to less optimal home environment and to higher maternal psychopathology. Clinic-referred young children exhibited more withdrawal behavior during interactions, which were often directed toward the mother (Dollberg et al., 2006). Assessing maternal representations with the PDI, mothers of clinic-referred infants expressed less joy, more disregulated anger, and lower sense of competence in the parenting role, and these representations were associated with lower sensitivity and child engagement and higher maternal intrusiveness (Dollberg, Feldman, & Keren, 2010). In terms of the family relationships, using an extensive interview of the entire family based on the MacMaster model of family functioning (Epstein, Bishop, & Levine, 1978), clinic families showed lower overall family functioning, particularly in the domains of communication, affective expression, and role definition and these family patterns were related to higher maternal intrusiveness and lower sensitivity during mother-child interactions (Keren, Dollberg, Kosteff, Danino, & Feldman, 2010).

Apart from the overall understanding that social-emotional difficulties in infancy are linked with disrupted early relationships, an important next step is to describe the relational profile of each psychiatric disorder of infancy. Observing the interactions between mothers and infants with feeding disorders, infants with other Axis I disorders, and case-matched controls, the relational behavior most notable in the feeding disorder group was diminished maternal proximity and affectionate touch. Mothers of infants with feeding disorders tended to position the child out of arms' reach during mutual play, provided minimal amounts of affectionate or even instrumental touch, and the children showed signs of touch aversion (Feldman, Keren et al., 2004). The relations between touch, feeding, and growth has been demonstrated in premature infants and these findings show a similar problem in cases of feeding disorders, which can assist clinicians in both the diagnosis process and the direction of intervention.

Infant PTSD is another psychiatric disorder of infancy, which was studied using the CIB system (Feldman & Vengrober, 2011; Feldman, Vangrober, & Hallaq, 2007). Israeli and Palestinian infants aged 1.5 to 5 exposed to continuous war, terror, and violence were compared with controls. A most obvious difference between groups was that exposure to trauma markedly constricts the child's symbolic play, creativity, and thematic play content. The free play of PTSD infants was impoverished and often marked by a functional rather than symbolic use of play material. Mothers of infants exposed to terror were either withdrawn and aloof or highly anxious and overstimulating, and the dyadic atmosphere was tense and constricted. In assessing the differences between war-exposed children who developed PTSD as compared to children exposed to the same war-related stressors who did not develop psychopathology, it was found that children's physiological stress response in terms of cortisol and salivary alpha amylase were different in the two groups and more resilient children engaged in a more reciprocal interaction with their mothers (Feldman, Vengrober, Rothman-Eidelman, & Zagoory-Sharon, in press). In addition, lower symbolic competence during play and higher maternal and child anxiety were related to higher posttraumatic distress symptoms both concurrently and in a 1-year follow-up (Vengrober & Feldman, 2012). Finally, observing relational patterns in a large group of infants referred to a mental health clinic in Berlin (zero to five years) headed by Dr. Andreas Wiefel, the specific profiles of interactions are being studied among three diagnostic groups; infants with affective disorders, infants with regulatory disorders whose condition is initially biologically based, and infants with attachment disorders whose condition is initially relationship-based. Such research can begin to tease apart the separate contributions of biological and relational factors as they interact to shape specific relational profiles, can assist in providing more accurate differential diagnosis, and can serve in guiding intervention efforts.

Change in Relational Patterns Following Intervention

Studies using the CIB to assess change in relational patterns following intervention are generally divided to two types: change following touch-and-contact interventions for premature infants and change following various forms of psychotherapy.

Touch interventions for premature infants. In a large study of premature infants who received skin-to-skin intervention (Kangaroo Care), an intervention in which incubated newborns are placed naked on the mother's skin and thermoregulation is maintained by the mother's body heat, as compared to matched controls who received standard incubator care, interaction patterns of Kangaroo infants and controls were followed from birth to ten years. At each time-point interactions between mothers and infants in the Kangaroo group were more optimal. During the first year, Kangaroo mothers were more sensitive and less intrusive, infants were more engaged, and the dyadic atmosphere was more reciprocal. Such findings emerged for both mothers and fathers, although fathers did not participate in the kangaroo intervention, and the family patterns of the treated infants was more cohesive and less rigid (Feldman et al., 2002, 2003). Observations at 2, 5, and 10 years showed that kangaroo infants and their mothers engaged in more reciprocal interactions and children were more socially engaged. These findings highlight the central importance of the mother-infant bond during the initial period of bond formation for the long-term development of the mother-child relationship. During this critical period for bond formation maternal touch was precluded for the control infants but was provided for the kangaroo group. Similar to the function of "maternal proximity" during the immediate post-birth period in mammals (Hofer, 1995), mother-child physical closeness functions to establish the infant's physiological, attentional, and social regulatory abilities. Results of the longitudinal follow-up demonstrated that the improved early interactions predicted better regulatory capacities, which,

in turn, helped preserve more positive interactions between mother and child across childhood (Feldman, 2004).

In addition to skin-to-skin contact mother-infant interactions were examined following massage therapy for premature infants, a regime of regular stroking of the infant's body which has shown to improve infant state and neurobehavioral maturation (Field, 1995). Three groups were tested in the hospital: infants receiving massage by mothers, infants receiving massage by nurses, and controls. At three months, infants receiving massage in both groups showed higher alertness and involvement and mothers who provided massage themselves displayed higher sensitivity (Goldstein-Ferber et al., 2005). Results of the kangaroo and massage interventions may point to two mechanisms by which touch interventions improve dyadic relationships. First, touch interventions improve the infant's state and reduce the child's negative emotionality, and this, in turn, enables better child social engagement. Second, the close physical contact between mother and child increases maternal investment, sense of competence, and familiarity with the infant's nonverbal signals and this leads to greater maternal sensitivity. As a result, the dyadic atmosphere becomes more reciprocal and less tense, mutually influencing child competencies and dyadic patterns.

Dyadic psychotherapy and psychosocial interventions. In a study assessing the outcomes of dyadic psychotherapy in the infant mental health clinic, mother-infant interactions were observed before treatment, following a 6–8 months dyadic psychotherapy, and a year after the termination of treatment (Dollberg, Feldman, & Keren, 2006). At each time-point mothers were interviewed with the PDI (Aber et al., 1999) and mother-child interactions were observed. Results indicated that maternal sensitivity increased after treatment and slightly decreased a year later but was still significantly higher than its initial level, and similar findings emerged for the mother's joyful and coherent representations of herself in the parental role, indicating that a treatment which focuses

on the dyadic relationships improves both the mother's representations and relational behavior and that this change persists long after the treatment is terminated.

Several research programs have used the CIB to assess change following interventions. Paris, Weinberg, and Bolton (2008) evaluated a home-based intervention for postpartum depressed women in Boston. Results from the baseline assessment showed that maternal sensitivity during a structured interaction was negatively related to the mother's depression and maternal sensitivity during an unstructured interaction was associated with maternal suicidality. Infant involvement during the unstructured interaction was negatively related to maternal suicidality. An intervention program for mothers who live in sheltered settings following acts of domestic violence is conducted in Jerusalem and at the Anna Freud Center in London. The London group is similarly conducting interventions with incarcerated mothers, using the CIB as a pre- and posttreatment evaluation tool. A French group is using the CIB for the evaluation of mother-infant psychotherapy, and a group in Dieseldorf, Germany is looking at the interactions of single mothers and their toddlers/preschoolers before and after a structured 20-session psycho-educational intervention. In all programs, change in individual scales is measured in addition to higher-order constructs, in order to specify the components most amenable to the specific intervention in the population studied. At the same time, the coding scheme is used not only as a scientific tool but as a framework that provides the language for intervention, highlighting to the mother the content, form, and structure of early social interactions.

Summary

Relationships are the context of infant growth. Parenting behavior is the force that underlies the development of relationships, carrying them from birth – when parents assume total control for the interaction – to adolescence – when a more balanced exchange is called for. With each

developmental progression, parents must modulate their parenting behavior, while keeping the same attuned, involved, and predictable style. Refining the language of behavior observation is required in order to anchor the study of human development in concrete measures of relationships, form theories based on a bottom-up methodologies, and expand the science of relationship in a rigorous, context-dependent, and comparative manner in order to provide a more detailed answer to the fundamental question of social emotional growth: how do early relationship shape the individual's body, mind, and personality.

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