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## Mothers' Perceptions of Their Infants

John Oates and Judit Gervai

**Abstract:** A mother's perceptions of her infant are a core component of her working model of attachment. Interview methods of assessing mothers' perceptions of their infants, while providing detailed and rich information, are time-intensive in administration and analysis. Therefore a questionnaire measure would be of value for research and healthcare practice. A 44-item questionnaire was developed to investigate the axes along which maternal models are organized. It was predicted that two primary axes, warmth and invasiveness, would be identified, and questionnaire data were collected from mothers in Great Britain and Hungary. The predicted axes were confirmed and a 14-item short-form questionnaire, with good psychometric properties, was derived.

**Keywords:** attachment, object relations, research and theories, pre- and perinatal psychology

In the perinatal stages of the development of the attachment relationship between mother and infant, a core element is the construction of “the infant in the mother’s mind.” When the basis for a secure attachment is beginning to develop, a mother will tend to represent her infant’s behavior and feelings towards her as predominantly positive in tone, and in consequence will behave in ways that establish positive emotional reciprocity. But this does not always proceed smoothly or on a good trajectory, putting the security of attachment at risk. Infant behavior is often unclear and not easy to read, and a mother who is under stress, depressed, or anxious may perceive her infant in ways that make it more difficult for her to build the foundation for a positive relationship.

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**John Oates** is a developmental psychologist at The Open University in UK. His research focuses on the role of social interaction in early child development and applications to health visitor practice, mother-infant psychotherapy and interventions for young children with special educational needs and disabilities, and in disadvantaged contexts. **Judit Gervai** is a scientist based at the Hungarian Academy of Sciences. Her research focus is on the contribution of biological and social processes to the formation of early relationships. She has been studying the role of gene-environment interactions in the development of mother-infant attachment. Emails: [john.oates@open.ac.uk](mailto:john.oates@open.ac.uk) [gervai.judit@ttk.mta.hu](mailto:gervai.judit@ttk.mta.hu)

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A mother's perceptions of her infant originate partly from the infant's characteristics and behavior, but they are also imbued with projective material deriving from her own inner dynamics (Slade & Cohen, 1996). Her feelings, behavior, and self-identification vis-a-vis her infant involve her internal working model of attachment. This model of her infant plays a complementary role to her model of herself as mother. A central aspect of how she relates with

her young infant is that she interprets her infant's behavior, in terms of its purpose and emotional content, in ways that mesh with the expectations of her working model. A mother attributes thoughts, feelings, and intentionality to her infant, and her own behavior is in turn affected by these attributions (Meares, Penman, Milgrom-Friedman, & Baker, 1982). It has been widely argued that this process commonly involves over-interpretation—that the infant's behavior is treated as if it is filled with agency and emotional content. Indeed, this has been seen by some theorists as a crucial part of an infant's induction into socially defined meanings for behavior (Hinde, 1976) and a key process in the social construction of development (Bruner, 1994; Vygotsky, 1978). Thus, the behavior of an infant crying because of hunger may be interpreted as, “I want feeding, and I want it now, from you (mother).” Further, a mother might also attribute intent to the infant, such as, “My baby is crying now because he wants me to stop what I am doing and give him attention as well as feed him.” As a result, a mother might attribute frustration and anger to her infant in such a situation, over and above the simple distress signalled by the cry.

However, infant behavior is deeply ambiguous in terms of its emotional and intentional content, permitting for multiple interpretations. The specific interpretational choice made by a mother is a consequence of an interplay between her internal dynamic and the infant's behavior. Her interpretations reflect her preoccupations, conflicts, and fantasies (Fraiberg, Adelson, & Shapiro, 1983). There is the risk of distorted models arising when the force of a mother's projections dominates her attributions, to the extent that there is little space for reality-testing against actual qualities of the infant. In such circumstances, an observer is likely to see misinterpretations of infant behavior having a major influence on interactions. For example, in Cramer and Stern's classic case-study (Cramer & Stern, 1988), prior to her treatment, the mother interpreted much of her infant's behavior towards her as invasive, hostile, and potentially damaging, and this was seen as stemming from her childhood experiences of invasive, painful medical treatments. Focusing on the source of these distorted interpretations rather than their manifest content, therapy was remarkably effective in reducing the proportion of the infant's behavior that the mother interpreted as invasive. In this case, it was notable that observers also recorded a positive change in the infant's behavior, evidencing how the mother's model was affecting her infant's behavior as well as her own. Distorted maternal representations have also been associated with child abuse and neglect (Main & Goldwyn, 1984; Milner, 2000; Stratton &

Swaffer, 1988), and with postnatal depression (Field, Morrow & Adelstein, 1993; Murray, Kempton, Woolgar, & Hooper, 1993).

### **Thinking about the Infant's Mind**

Reporting on findings showing a link between maternal *reflective functioning* and infant attachment, Slade, Grienenberger, Bernbach, Levy, and Locker (2005) proposed that it is a mother's "capacity to understand the nature and function of her own as well as her child's mental states that allows her to create both a physical and psychological experience of comfort and safety for her child" (p. 284). A caregiver's reflective functioning thus leads them to show in their behavior and speech that they are actively thinking about their child's inner world. It has been argued that this can help a child to develop the ability to regulate emotions, which is an important skill in forming positive relationships (Fonagy, Gergely, Jurist, & Target, 2002). There is also evidence of a connection between maternal 'mind-mindedness' and attachment security in the infant (Meins, Fernyhough, Fradley, & Tuckey, 2001). By using the term mind-mindedness, these authors highlight the importance of a mother's capacity to think about the contents of her infant's mind—to attribute thinking and feeling capacities to her infant.

### **Infant Temperament and Maternal Attributions**

Research in the assessment of infant temperament has also contributed to an understanding of the significance of maternal models, in that the correspondence between mothers' reports of their infants' temperament and reports by independent observers is substantially lower than one might expect if mothers' models are solely based on infant characteristics. This finding is often interpreted as due to the influence of maternal attributions (Bates, Freeland, & Lounsbury, 1979; Meares et al., 1982), a view supported by the finding of a relation between mothers' attitudes to childrearing before the birth and judgments of infant temperament made by the same mothers after the birth (Vaughn, Bradley, Joffe, Seifer, & Barglow, 1987). Further support for this view is given by evidence of stability in infant temperament judgements made by mothers during pregnancy and after the birth (Zeanah, Keener, Stewart, & Anders, 1985). It has also been found that differences in mothers' identifications with their fetuses, the initial models of the infant-to-be, are predictive of mothers' models of their infants' emotional and cognitive capacities at 2-3 months, and also of their

infants' levels of engagement with them (Oates, 1998). These early stages in the emergence of what Klein described as a projective identification (Klein, 1946) have been found in other studies to be an indicator of developmentally important aspects of how mothers subsequently relate with their infants one month after the birth (Ammaniti, 1991).

### **Internal Working Models of the Infant and Attachment Processes**

Representations of self and other, and of the dynamic relation between them, are core elements in the development and maintenance of attachments (Bretherton & Munholland, 1999). The development of attachment from the infant's side of the mother-infant relationship entails the construction of an internal working model, *ab initio*. This model represents the predictability of the action-response dynamic within the dyad. From the mother's side, the attachment relationship brings into play pre-existing psychological structures, activated even before the infant's birth. Differences in mothers' working models during pregnancy have been associated with differences in infant attachment as measured in the Strange Situation (Benoit, Parker, & Zeanah, 1997; Fonagy, Steele, & Steele, 1991). A large body of empirical evidence has shown that infant attachment (Ainsworth, Blehar, Waters, & Wall, 1978) is associated with mothers' internal working models as assessed by the Adult Attachment Interview (Main, Kaplan, & Cassidy, 1985; Fonagy, Steele, Moran, & Steele, 1993; van IJzendoorn, 1995).

### **Object Relations**

In the terms of object relations theory, the infant as an object in the mother's inner world is initially constructed as a nexus of a variety of fantasies, arising from the mother's specific psychodynamics. The relationship that develops with her real infant is the result of a complex interplay between these fantasies and her reality testing against the infant's own characteristics and needs. The mother creates an internal object, a representation of her infant, with which she has a relationship, and her behavior with the "real" infant, the "observed" infant, is suffused with the qualities and dynamics of this internal relation. The effects of this internal relation with the "constructed" infant can be positive for both infant and child, where the internal object is filled with goodness and idealized contents, and the real infant's behavior is represented as loving and warm towards the mother. Or, the internal representation may hold predominantly bad feelings, with the infant then tending to be seen as persecutory, with negative effects for the relationship.

The coherence of the internal object can also vary; for example, it may come to hold conflictual themes, such as wishes for closeness conflicting with fears of being overwhelmed. A dominant theme in all of these is the emotional relationship with the infant. For the mother, how her infant feels towards her is often a most pressing issue in the developing relationship (Kaplan, 1992).

### **Interview Techniques**

Direct assessment of mothers' models of their infants has, to date, commonly been carried out as one of several focal areas of interest within semi-structured interview techniques designed to explore attachment-related representations. Several similar protocols have been documented, each defining a set of topics in which question probes allow the exploration of mothers' representations, wherein representations of their infants form a part: the Representation Interview (R-interview; Cramer, Robert-Tissot, Stern, & Serpa-Rusconi, 1990), the Working Model of the Child Interview (WMCI; Benoit, Zeanah, Parker, & Nicholson, 1997), and the Interview of Maternal Representations during Pregnancy (IRMAG; Ammaniti, Baumgartner, Candelori, & Perucchini, 1992). The Parent Development Interview (PDI; Aber, Slade, Berger, Bresgi, & Kaplan, 1985) includes questions regarding the mother's model of her infant, as well as of herself as a parent and as a partner. The Experiences of Caregiving Interview (ECI; George & Solomon, 1996), an adaptation of the PDI, is designed to activate a parent's working models of self as parent, of the child and their relationship. Such methods generate rich data, and have led to substantial new findings, but are also time-intensive to administer and analyze. Used for clinical purposes, the semi-structured nature of these methods offers the advantage to the clinician of being able to explore areas of narrative that suggest the possibility of specific insights into the individual's psychodynamic processes and directions for therapeutic intervention.

A general aim of these interview methods, when used in research, is often to move towards a systematic classification of each case into one of a small number of discrete, mutually-exclusive classes, or to develop interpretive descriptions of representational styles as illustrated in the narratives. While these approaches offer rich primary data and detailed interpretive analyses, and are also useful for diagnostic purposes, they are time-consuming in both the collection and analysis stages. Substantial training is also required by interviewers to ensure consistency of approach and adherence to the interview protocols.

## **Attachment Styles and Dimensions**

Much of the research and theory on attachment is conceptualized within frameworks of categorical classification, for example Ainsworth's infant attachment classifications (Ainsworth et al., 1978) and the adult attachment styles identified by Main and Goldwyn (1984). Such approaches are not necessarily in opposition to conceptualizations that posit dimensions along which individuals can be located. Underlying typological approaches are often dimensional concepts, such as approach-avoidance, rigidity-flexibility, and regulation-dysregulation, as discussed by Slade (1999). Where the richness of interview data is not required, or where quantitative, scalar data is needed from relatively large samples, there would be significant advantages in having a psychometric instrument that would allow the measurement of mothers' representations on identified axes by the administration of a single, easily-coded questionnaire. Such an instrument could be valuable not only in research, but also in clinical assessment—for example in primary care screening for disorders of mother-infant relationships.

## **The Psychometric Approach and Descriptive Axes**

Psychometric techniques for assessing relationships and their qualities typically make use of a small number of well-defined axes along which individual responses are scored. The organizing axes of mothers' perceptions of their infants are evidenced when they give narrative accounts of their infants and their experiences with them, much the same way as the Adult Attachment Interview can yield organizing themes from adults' narrative accounts of their attachment-related experiences during their childhoods (Main & Goldwyn, 1984). In dimensional analyses of parent-child related beliefs and behavior, the two most widely found descriptive axes are those of *care* and *control* (Hinde, 1976; Schaefer & Bayley, 1961). The care axis has warmth and coldness as polar opposites, measuring the affective tone of relationships. The control axis has encouragement of autonomy and invasiveness as its polar opposites, measuring the extent to which the relationship is characterized by controlling behaviors. For example, the Parental Bonding Instrument (PBI; Parker, Tupling, & Brown, 1979) assesses on two scales of *parental care* and *overprotection* a person's representation of how they were treated during childhood by their parent(s).

## **The Aims of the Present Studies**

The set of studies reported in this paper was carried out with two main aims. First, to develop a theory-based questionnaire instrument that would have utility in research as a measure of mothers' representations of their infants' feelings towards them, and second, to construct a short form suitable for use also in health practice—for example in primary-care screening where there is a need for a simple and valid measure of mother-infant relationship quality.

In line with the discussion above, it was predicted that two independent axes, care and control, would be evident as primary organizing dimensions of mothers' models of their infants. If so, this would then support the construction of an instrument yielding two scalar values. In keeping with the theoretical origins of the instrument as described above, it was named the Mothers' Object Relations Scales (MORS).

## **Strategy**

Working towards these aims, the first step was to explore the nature and dimensionality of mothers' perceptions of their infants, by generating a multi-item questionnaire making use of a wide range of descriptors of infants and their behavior, derived from mothers' narrative accounts given in semi-structured interviews. Parallel data was then collected using this questionnaire in two different European countries, Great Britain and Hungary, to seek common axes and at the same time to examine possible cross-cultural variations. Principal components analyses were planned, to identify consistent patterns of response across different subsets of the items, along with other statistical analyses to examine the performance of each item. The second stage was to develop a short form of the questionnaire, based on the statistical analyses, focused on those items that were most sensitive and specific to the axes that were identified.

## **Methods**

### **Participants**

Data were initially gathered from a total of 234 mothers with infants aged between two and six months, covering a range of socio-economic backgrounds and ages, and including both primiparous and multiparous mothers. All participants were white Caucasian, from low-risk



general community populations and without major health problems. In Great Britain, 100 participants were recruited in East London, Milton Keynes, Durham, and Birmingham. In Hungary, 134 participants were recruited in Budapest. Appropriate ethics guidelines and procedures for consent were followed.

## **Procedure**

A set of brief descriptors of infants' feelings, cognitions and behaviors was generated by examining narrative accounts given by mothers in previous research (Oates, 1998) and in published material containing such descriptors (Brazelton & Cramer, 1990; Kaplan, 1992; Miller, Rustin, Rustin, & Shuttleworth, 1989; Oakley, 1979). A large number of short descriptors was extracted and assembled, synonymous descriptors were grouped and the most clearly expressed of them were retained. Forty-four items were selected to sample a wide range of aspects of infants as described by mothers, with a focus on those that concerned relations with, and behavior towards, the mother. The items were also chosen to be evocative of projective content from the mother. It was intended to free the mother as much as possible from manifest self-report, by concentrating on descriptors which were explicitly located in the infant, yet allowed the mother's attributions to come through. So, for example, "cares about my feelings" is a descriptor of the infant's emotional world, in relation to the mother, but it is also a latent container for a mother's attributions and needs for emotional reciprocity from her infant.

Items were presented with a six-point Likert scale response format, defined as "how often the following are true of your baby" with response points "always," "very often," "quite often," "sometimes," "rarely," and "never." The items were translated into Hungarian, back translated for accuracy and piloted in both countries, with minor changes to wording to improve clarity. The full set of items as included in the final version is shown in Appendix 1. After further piloting to confirm the acceptability of the items and the ease of completion of the questionnaire, the final version was administered to mothers of infants in Great Britain and Hungary.

## **Method of analysis**

The data from both countries were combined and the item score distributions were examined to identify highly-skewed, non-discriminating items. Seven items (items numbered 4,

8, 19, 30, 38, 40 and 42; see Appendix 1) were eliminated on this basis at this stage, leaving data from 37 items.

The reduced British and Hungarian datasets were then analyzed separately, to identify primary axes underlying mothers' responses to the questionnaire. Using SPSS, components were extracted using Principal Components Analysis (PCA), with Varimax rotation.

Next, the datasets were merged and a constrained PCA was carried out to identify the common latent structure, and a hierarchical cluster analysis of the item scores (Ward's method on squared Euclidean distances) was carried out to confirm the componential structure.

## Results

### British Dataset

After applying the extraction method and procedure described above, examination of the scree plot suggested that a four component solution was appropriate, with a discontinuity after the fourth component. An examination of the high-loading items associated with the first four extracted components suggested that they described meaningful and differentiable axes. The sets of items associated with the five subsequent components did not show any such obvious coherence, nor did they explain large amounts of variance. This solution explained a total of 46.8% of the data variance. The high loading items on each of these four components are shown in Table 1. The component that explained the largest proportion of variance contained high loading items that were clearly describing a “warmth” dimension. The second component also contained conceptually coherent items describing a dimension that could be labelled as “disturbance of the mother”. The third component contained high loading items on the theme of emotional demands on the mother. Items loading high on the fourth component had connotations of emotional withdrawal by the infant. Conceptually, the latter three components appeared to represent elements of the general construct of “invasion-withdrawal.”

Table 1. Principal Components in the British Dataset (four-factor solution).

Component	% of variance	Highest loading items (score weight)
Warmth	17.0	is affectionate towards me (.84)

		laughs (.81) smiles at me (.81) 'talks' to me (.79) likes doing things with me (.75)
Disturbance	11.8	annoys me (.83) winds me up (.72) irritates me (.65) stirs me up (.62) is exhausting (.58)
Emotional demands	9.1	wants too much cuddling (.81) wants too much attention (.77) is too dependent on me (.53) knows how to get his /her own way (.52)
Withdrawal	8.8	gets moody (.69) is unpredictable (.57) cries for no obvious reason (.56) gets sad (.54) is perfect (-.54)

Three- and two-factor solutions for the British data showed the “invasion” components progressively combining, while the “warmth” component remained independent. A constrained two-factor solution explained 34.5% of the data variance, with 17.4% explained by the invasion factor and 17.1% by the warmth factor.

### Hungarian Dataset

When the same analysis was applied to the Hungarian data, three of the four resulting components were similar to the first three factors in the British dataset, although their relative contributions to explained variance were more equal to each other, as can be seen from Table 2.

Table 2. Principal Components in the Hungarian Dataset (four-factor solution).

Component	% of variance	Highest loading items (score weight)
Power	11.8	is stubborn (.85) is strong willed (.82) is demanding (.77) knows how to get his/her own way (.53)
Disturbance	11.6	winds me up (.77) annoys me (.75) irritates me (.67)

Warmth	11.2	is affectionate towards me (.74) laughs (.69) smiles at me (.70) 'talks' to me (.65) likes to please me (.64)
Emotional demands	7.1	is too dependent on me (.80) wants too much attention (.72) wants too much cuddling (.69)

The three-factor solution for the Hungarian data showed a similar pattern to that in the British data, with a warmth factor first in order of explained variance, a combined power and disturbance factor coming second, followed by an emotional demands factor. The two-factor solutions from each country's datasets were, however, the most similar. The Hungarian two-factor solution explained 28.6% of the variance, with the invasion factor explaining 14.8% and the warmth factor explaining 13.8%. The factors had very similar item loadings to the British two-factor solution.

### A Two-Factor Solution for the Combined Dataset

Given the similarity in results for the two datasets, they were then combined and re-analyzed together to yield a common factor structure. Since the two-factor solutions for each country showed the highest level of similarity, the solution was constrained to two components: a clear invasion factor emerging that explained 29.2% of the variance and a distinct warmth factor emerging that explained 17.7% of the variance. The seven highest loading items on each of these two components are given in Table 3. All of these loadings were high—at .7 or greater.

Table 3. Principal Components in the Combined Dataset (two-factor solution).

Component	% of variance	Highest loading items (score weight)
Invasion	29.2	gets moody (.80) wants too much attention (.78) irritates me (.75) winds me up (.75) dominates me (.73) cries for no obvious reason (.72) annoys me (.71)
Warmth	17.7	is affectionate towards me (.87)

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‘talks’ to me (.80)  
likes doing things with me (.77)  
smiles at me (.76)  
laughs (.75)  
likes to please me (.74)  
likes me (.66)

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### **Cluster Analysis: Combined Dataset**

Two clear, well-distinguished clusters were identified from the analysis of the combined dataset, one including all the high-loading “warmth” items and the other including all the high-loading “invasion items”. The “emotional demands” items were contained within a distinct sub-cluster, as were the “disturbance” items. Although the “power” items were spread across different sub-clusters, they were still contained within the main invasiveness cluster.

### **Test-Retest Reliability**

The 44-item questionnaire was administered to a new, healthy, Hungarian, low risk, white Caucasian community sample of 36 mothers, with infants aged between six and 12 months, on two occasions, with a two to three week interval. After excluding the seven non-discriminating items, the remaining 37 items showed a median reliability coefficient of  $r = .61$  with a range from .91 - .11. It is noteworthy that the high reliabilities were found for the invasion-related items, and the lower were for the warmth-related items.

### **Evidence for Organizing Axes**

These results are strong evidence for the existence of a general, primary axis that organizes mothers' perceptions of their infants, concerned with aspects of infants' emotions towards the mothers. In both Britain and Hungary, items such as “is affectionate towards me” and “likes doing things with me” are responded to consistently by mothers, showing that these items are meaningful to them as descriptors of their infants. In both countries, a principal component containing items in this area captures a significant proportion of the variance in the responses of different mothers. This result is consistent with our prediction that a “care” axis, with warmth and coldness as polar opposites, concerned with the emotional tone of the infant's feelings, would be one of the primary dimensions revealed in these data. It is noteworthy that the

high loading items on this axis predominantly reflect perceptions of the infant's feelings specifically towards the mother, lending further support to the view that perceptions of the infant are constructed in part through the mother's projective wishes and needs for herself.

The prediction was supported that another primary axis would be concerned with issues of perceived control in the mother-infant relationship, in that items tapping such issues did indeed emerge as having high loadings on components. The two-factor solutions for the two datasets, both separately and for the combined set, consistently showed items associated with perceptions of invasiveness loading highly on one factor, alongside the clearly present warmth factor. Three and four-factor solutions also showed conceptually coherent groupings of items, suggesting that the general invasion axis could also be seen as divisible into a “disturbance of the mother” axis and an “emotional demands” axis, based on the three-factor solution. The four-factor solutions differed between the countries, with items suggesting a “power” axis loading on a factor in the Hungarian data and items suggesting an “emotional withdrawal” grouping in the British data.

Item reliability coefficients were generally adequate, being high for invasion items. Some warmth items showed low reliability, perhaps reflecting in part variations in infants’ affective states across the test-retest interval.

### **Derivation of the Short Form of MORS**

These results were sufficiently encouraging to move to deriving a short-form version of the scales, based on the 14 high-loading items from the two-factor solution—the total of the scores on seven items giving a value on the “invasion” dimension and the other seven items’ total scores contributing to a “warmth” value. This MORS short form (MORS-SF) set of 14 items is shown above in Table 3.

An adequate psychometric instrument should be internally consistent, should have clear face validity, and multiple axes should be sufficiently independent. The items to which responses are made should show explicit, clear, and unambiguous relations to the theoretical construct(s) that the instrument purports to measure and the responses to different items that purport to measure the same construct should be closely correlated, both statistically and in their manifest meaning.

## **Internal Consistency and Item Contributions**

The finding of common structure in the Hungarian and British data is a first confirmation of the validity of the underlying two-axis structure of the instrument. Further support is given by the manifest semantic relation of the high loading items on these axes to the dimensions of invasion and warmth commonly found as organizing axes of representations of relationships between parents and children, and between adults (Schaefer, 1965; Parker et al., 1979).

Each MORS-SF item loads positively on its associated axis, hence sum scores were used for all calculations: thus increasing values on the Warmth axis represent increasing perceived infant warmth, and increasing Invasion axis values indicate increasing perceived invasiveness. Cronbach's alpha values for both the Invasion and Warmth scales were .90, indicating high internal consistency.

## **Face Validity**

The items comprising the short-form were all derived from statements made spontaneously by mothers when describing their infants. They were then extensively piloted and mothers found them unambiguous and easy to respond to. It is evident that each item captures an element of maternal interpretation of infant experience and behavior and hence is tapping into the content of an internal working model rather than simply capturing surface observations. This latter point is supported by the fact that most of the 14 items are clearly concerned with the infant in relation to the mother, rather than just the infant as an isolated individual. The item that does not immediately appear to carry such content is "gets moody." However, this also requires an attribution by the mother of a specific mental state to the infant and such attributions, of "being moody" tend to be accompanied by related behaviors on the part of the mother, such as withdrawal. Hence, it can be argued that this item also captures a relational aspect of the mother's perceptions of her infant. Thus, we argue that the face validity of the instrument, as a means of capturing components of a mother's working model of the infant in relation to her, is amply demonstrated.

## **Independence of the Axes**

The inter-correlation of the two axes was statistically significant but low in magnitude ( $r = -.27, p < .01$ ), indicating only 7.5% shared variance. This shows that a perception of low infant warmth is weakly associated with a perception of high invasiveness. This level and direction of inter-axis correlation is comparable to that found for the widely-used Parental Bonding Instrument, a 25-item questionnaire assessing representations of parenting along axes of ‘care’ and ‘control’ (Parker et al., 1979), equivalent to the axes in the MORS-SF. Thus, the relative independence of these axes is supported.

## **Test-Retest Reliability**

As noted earlier, an additional administration of the 44-item MORS was carried out for test-retest reliability assessment with 36 mothers of infants aged between six and twelve months. For the MORS-SF Invasion scale, the test-retest reliability coefficient was  $r = .77$ , and for the Warmth scale it was  $r = .70$ .

## **Distribution Statistics for the Original Datasets**

For the original British dataset, the MORS-SF Warmth axis mean score was 29.0 (SD = 3.7) and for Invasion, 11.3 (SD = 4.3). For the original Hungarian dataset, the Warmth score mean was 28.8 (SD = 3.3) and for Invasion, 7.8 (SD = 4.0).

## **Conclusions**

The psychometric properties of the MORS-SF, as assessed from data in the original MORS 44-item Hungarian and British datasets and an additional Hungarian reliability dataset, have been shown to be adequate, and sufficient to warrant further validation of the instrument. As well as providing scores on the two primary axes, this version will also be sensitive to fine-grained differences, such as the cultural differences evidenced in these data. Clearly, further work would be valuable to confirm its utility for research purposes—for example, to examine the relation between MORS scores and narrative interview data using a protocol such as the Working Model of the Child Interview (WMCI; Benoit et al., 1997). Exploring links with mothers' personality dynamics would help to identify causes of variation in mothers' attributions



arising from this source. It would be of interest to investigate links between variations in mothers' behavior towards their infants and MORS scores, and to use MORS to investigate possible transmitted effects of mothers' working models on infant development. It would also be of value to explore further the balance between projective and reality-based content of mothers' attributions as assessed on these axes—for example, by exploring the contribution of independent measures of infant physiological differences such as reactivity. The short-form, MORS-SF, has been shown in this study to be of potential use as an easy-to-administer research instrument to assess mothers' models of their infants on the two axes of perceived invasiveness-withdrawal, and warmth-coldness of the infant towards the mother.

With continued validation of the instrument, the findings of these studies offer strong support for the future use of the MORS-SF in primary care, as the screening tool is non-threatening and easy to administer and score. The MORS-SF indicates potential difficulties in mother-infant relationships during the first 12 months postpartum, and could aid decision-making about the deployment of appropriate supportive or therapeutic interventions, and tracking response to treatment.

Note: Copies of both the 44-item MORS (formatted as a landscape, double-sided, A4 proforma in English and Hungarian versions), as well as the MORS-SF (formatted as an A5 self-completion booklet entitled 'My Baby' in English, Hungarian, Polish, Hindi and Simplified Chinese versions) are available from the first author.

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**Appendix 1. The initial 44-item MORS and the reduced 37-item version.**

		My baby:	
1	stirs me up	23	gets sad
2	is happy	24	knows how to get her/his own way
3	annoys me	25	is affectionate towards me
4	<i>loves me*</i>	26	gets moody
5	is demanding	27	makes me anxious
6	winds me up	28	is unpredictable
7	goes to sleep easily	29	smiles at me
8	<i>recognises me*</i>	30	<i>rejects me*</i>
9	gets angry with me	31	is perfect
10	reminds me of his/her father	32	is exhausting
11	cries for no obvious reason	33	is too dependent on me
12	is easily comforted	34	wants too much cuddling
13	likes me	35	likes my company
14	is strong willed	36	wants too much attention
15	irritates me	37	is stubborn
16	cares about my feelings	38	<i>disappoints me*</i>
17	is naughty	39	is greedy
18	'talks' to me	40	<i>reminds me of my father*</i>
19	<i>reminds me of my mother*</i>	41	laughs
20	gets frustrated	42	<i>is inquisitive*</i>
21	likes to please me	43	needs firm handling
22	dominates me	44	likes doing things with me

\* seven non-discriminating items removed to leave the final 37-item MORS