

# Father–Infant Interaction, Paternal Ideas About Early Child Care, and Their Consequences for the Development of Children’s Self-Recognition

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**ABSTRACT.** In this longitudinal study, the authors addressed intracultural variation on fathers’ interactions with their 3-month-old infants, their ideas about parental care, and the timing of their children’s self-recognition at the age of 18–20 months. Participants were 24 middle-class German fathers and their firstborn children. Two behavioral clusters emerged: a more proximal parenting style with extensive body contact and a more distal parenting style with extensive object stimulation. Fathers in the distal cluster had significantly more education than did fathers in the proximal cluster. Children who had experienced more distal parenting were more likely to recognize themselves in a mirror than were children with more proximal parenting. The authors discuss the results with respect to fathers’ influence on child development and patterns of intracultural variation.

**Keywords:** father–infant interaction, paternal ideas, self-recognition

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**PARENTING PRACTICES AND PARENTING IDEAS** are generally related to cultural models (e.g., Bornstein et al., 1996; Keller et al., 2006). Scholars have described two major sociocultural frameworks: the model of independence and the model of interdependence (Kağıtçıbaşı, 1996; Markus & Kitayama, 1991). The model of independence concentrates on the perception of the individual as bounded and self-contained and focuses on mental states and personal qualities

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that support self-enhancement and self-maximization. The model of interdependence emphasizes the perception of the individual as interrelated with others (coagent) and as accepting norms and hierarchies to contribute to the harmonic functioning of the social unit and, in particular, the family (Greenfield, Keller, Fuligni, & Maynard, 2003; Keller, 2003). Independence and interdependence are perceived as two independent dimensions that are both part of the sociocultural orientation of any cultural community and the psychology of any human being. Cultural and personal styles are realized in specific mixtures of both dimensions (Keller, 2002; Kitayama, 2000). Because these orientations are constructed and coconstructed during socialization processes, researchers can expect intracultural variability. Scholars assume level of education to be a correlate for intracultural variation in parenting (Kusserow, 1999; LeVine, Miller, Richman, & LeVine, 1996; Palacios & Moreno, 1996). For instance, LeVine et al. showed that mothers with more years of school attendance expected their children to recognize the mother's voice earlier and responded more often to infant vocalizations. Moreover, there is evidence from cross-cultural studies that higher educational attainment is connected with more independent maternal beliefs and behaviors (e.g., Kağıtçıbaşı; Keller, Lohaus, et al., 2004).

Because parenting practices can be seen as the expression of parental ideas and both are substantial dimensions of children's developmental niches (Super & Harkness, 1994), we assessed fathers' behaviors and ideas about parenting. Our study began when babies were 3 months old because this is a prominent age to study infant-caregiver relationships with respect to later developmental achievements (Keller, 1992; Keller & Gauda, 1987; Keller, Kärtner, Borke, Yovsi, & Kleis, 2005; Keller, Yovsi, et al., 2004).

Researchers have analyzed different styles of parenting small infants across cultures (Bornstein, 2002; Harwood, Miller, & Lucca Irizarry, 1995; Keller & Greenfield, 2000; LeVine, 2002; Rogoff, 2003). A more distal parenting style consists of more face-to-face contact and object stimulation and less body contact and body stimulation. This style of parenting is characteristic of higher educated parents who hold independent socialization goals and therefore emphasize children's agency and autonomy from early on. A more proximal style of parenting consists of more body contact and body stimulation and less face-to-face contact and object stimulation. This style of parenting is more characteristic of lower educated parents, who, holding interdependent socialization goals, emphasize children's relatedness and heteronomy. Researchers have identified both styles in maternal parenting practices and parenting ideas (Keller, 2003; Keller et al., 2006; Keller, Lohaus, et al., 2004; Keller, Voelker, & Yovsi, 2005), but the parenting styles have not been established for fathers.

Studies on mother-infant interactions have revealed that early parenting experiences have specific consequences for children's later developmental achievements. We expected a more distal style of parenting to prompt the formation of a more independent self, because face-to-face contact and

contingency toward positive signals have a distinct relation to the development of agency, autonomy, and control (Skinner, 1985). We further assumed that the more proximal style of parenting would foster the development of a more interdependent self, because body contact and warmth during interactions predict various later developments such as acceptance of family norms and values, compliance, and obedience (Hetherington & Frankie, 1967; Keller, Yovsi, et al., 2004; MacDonald, 1992).

Some researchers have suggested that paternal behavior plays an important role in child development. For example, a father's sensitivity in play interactions with his 2-year-old child is a more stable predictor of the child's long-term attachment representation at ages 10 and 16 years than is maternal interaction behavior (Grossmann et al., 2002). However, research on fathers is scarce compared with research on mothers.

In the present study, we focused on self-recognition as one of the important and prominent developmental milestones in self-development (e.g., Bischof-Köhler, 1989). Achieving self-recognition allows infants a new perspective on the world and influences their perception of the self and their interaction with others. For example, the development of empathy is connected to having self-knowledge (Bischof-Köhler, 1989, 1991). Researchers studying the development of self-recognition have demonstrated that 18-month-olds begin to respond to their mirror image as if they recognize it to be their own face (Lewis & Brooks-Gunn, 1979; Lewis, Sullivan, Stranger, & Weiss, 1989). Therefore, 18-month-olds do not react to the mirror image as if it were a playmate or look for the other toddler behind the mirror, and if they detect a peculiarity in their mirror image they touch their own face. Researchers take these behaviors as strong evidence that the child has acquired the awareness that the self is a separate, physical entity and a source of actions, words, ideas, and feelings (Edwards & Liu, 2002) and thus has reached the developmental milestone of self-recognition.

Cross-cultural studies have shown that an emphasis on independence in maternal practices and ideas accelerates children's formation of a categorical self. For example, Keller, Yovsi, et al. (2004) demonstrated with data from Cameroon, Costa Rica, and Greece that a more distal maternal parenting style during infancy, in contrast to a more proximal parenting style, was a significant predictor of an earlier appearance of self-recognition irrespective of the cultural background. In the present study, we explored whether self-recognition was similarly contingent on paternal ideas about infant care and on father–infant experiences in a German middle-class sample. We assessed these behavioral patterns in a cultural environment in which the mainstream ideology of childcare is oriented toward an independent cultural model. Nevertheless, we expected interpersonal variation.

We tested three hypotheses: (a) that within a German sample of middle-class fathers, we could identify both a more proximal style of parenting infants, consisting of body contact and body stimulation, and a more distal style, consisting of face-to-face contact and object stimulation; (b) that the fathers with a more distal

parenting style would be more highly educated than would fathers with a more proximal parenting style; and (c) that infants whose fathers emphasized face-to-face contact and object play would develop self-recognition earlier than would infants whose fathers focused on body contact and body stimulation.

## Method

### *Participants*

In this longitudinal study, 24 German fathers and their firstborn children (12 girls, 12 boys) participated in two assessments. All children were physically healthy at the times of the assessments and had had no medical complications during birth or afterwards. We recruited the participants from parenting classes in city family centers and from the newborn ward of a local hospital, and we asked participants and professionals to refer other potential participants.

All 24 families lived in urban areas in the north of Germany and were middle class. The majority of participants had a high level of education: 41.7% held a university degree, another 29.1% had reached the *Abitur* (the general qualification for university entrance in Germany), and the remaining 29.1% had completed secondary school. The fathers' mean age at the time of the first assessment was 32.2 years ( $SD = 4.28$  years); 18 fathers (75%) were married at that time and 6 fathers (25%) lived with the mother of the child without being married. Of the 24 families, 10 had a second child at the time of the second assessment.

We could not locate 2 families who had participated in the first assessment for the second assessment, and 3 fathers did not want to participate in the second assessment. These 5 fathers did not differ from the remaining 24 fathers on any behaviors, beliefs, or sociodemographic characteristics that we assessed at the first data collection.

### *Assessment at 3 Months*

The first assessment took place when the infants were 3 months old ( $M = 92.7$  days,  $SD = 3.8$  days). We informed the families that we were interested in fathers' behavior and child development. Because of the importance of collecting the data in a familiar environment, two researchers visited the families at home. The visits started with a 15-min warm-up phase consisting of researchers chatting with the father and explaining the procedure. Then researchers elicited demographic information. Thereafter, researchers videotaped a 10-min free-play session between fathers and babies. Infants had to be recently fed and awake during free play, but we gave fathers no further specifications. Finally, we assessed fathers' parental ideas by asking them to comment on each of ten 2-min long video clips showing different types of father–infant interaction. On average, this first assessment took about 90 min.

*Analysis of interaction behavior.* We analyzed the videotaped free-play interactions with a computer-based video analysis system (Voelker et al., 1999) based on the component model of parenting (Keller, 2007). First, we divided the free-play interaction into 10-s intervals. Next, we coded the four relevant parenting systems—body contact, body stimulation, object stimulation, and face-to-face contact—separately within these intervals. Because we were interested in play behavior, we included in the analysis only intervals in which children were awake and in a positive or neutral state. If we could not clearly see the positions of the father or the child, we coded the events as not visible. Therefore, we based our measurements and assessments of reliability on episodes during which the relevant behavior was not obscured in any way.

We scored the categories defining body contact and face-to-face contact when they occurred for at least 5 s during the 10-s interval. We scored body stimulation and object stimulation when they occurred at any point during the 10-s interval. For the exact coding of the categories, see Keller, Yovsi, et al. (2004).

We calculated the reliabilities for each category on the basis of a subsample of 10 video sequences that two coders, who had not visited the families and were thus not present during the recording of the interaction, coded independently. Cohen's kappa was .86 for body contact, .90 for body stimulation, .99 for object stimulation, and .85 for face-to-face contact.

*Analysis of parental ideas.* To assess the fathers' parental ideas, we presented 10 video clips showing 10 different fathers interacting with their 3-month-old infants to each of the participants. The video clips represented each of the parenting systems—body contact, body stimulation, object stimulation, and face-to-face contact—as specified in the component model of parenting (Keller, 2002; Keller, Lohaus, et al., 2004). We asked the participants to address the following questions: "What did you like in this scene?"; "What did you not like?"; and "Was there something that you found particularly striking?" The answers were probed until no new information was elicited. In previous studies, the video clips adequately elicited spontaneous evaluative comments concerning parenting behaviors (Keller et al., 2005; Keller, Yovsi, & Voelker, 2002).

We tape-recorded the comments and transcribed them verbatim. Based on a manual by Voelker et al. (2000), we divided the statements into meaning units (comments). We excluded comments that did not deal with paternal behavior at all (irrelevant comments; 22.3% of all comments) from further analysis. We coded the remaining comments (relevant comments) for their mentioning one of the parenting systems: body contact, body stimulation, object stimulation, and face-to-face contact. Comments concerning other parental behaviors, such as feeding or giving comfort, we did not analyze further in this study.

For all four categories, we calculated the ratio between the number of comments referring to a particular category and the total number of relevant comments. The exact coding of the categories follows:

1. *Body Contact*: comments about the extent or absence and quality of body contact between father and child.
2. *Body Stimulation*: comments referring to physical exercises.
3. *Object Stimulation*: comments concerning fathers' use of objects (toys, household goods, etc.) in the interaction with the infant.
4. *Face-to-Face*: comments referring to mutual eye contact between father and infant, including terms such as *dialogue* or *conversation*.

The coder of the parental ideas was not familiar with the study's assumptions. Cohen's kappa, registered in a pretest with other trained coders, was .76.

*Sociodemographic variables.* The assessment of sociodemographic variables included the gender and age of the infant; age, education (years of schooling), and birth rank of the father; and the average length of time (in hours) that the father reported interacting with his child on a daily basis.

#### *Assessment at 18–20 Months*

The second assessment occurred when the children were between 18 and 20 months old. We contacted the families about 4 weeks before the child was in that age range. The assessments again took place in the homes of the families and were conducted by the same researchers as in the first assessment.

Each visit started with a 30-min warm-up phase so that the child could become familiar with the two visitors. One researcher arranged the tasks, and the other ran the video equipment.

We assessed children's self-recognition with the rouge test (Amsterdam, 1972; Bischof-Köhler, 1989), which lasted about 20 min. We used a mirror in which the child could see at least his or her upper trunk and face. First, the researcher set up the mirror near the child. Then the researcher drew the child's attention to the mirror to familiarize the child with the situation. After about 10 min, the present caregiver (the mother or the father) wiped the nose of the child while at the same time coloring it with a red mark. Then the child was confronted with the mirror again (Bischof-Köhler, 1989; Lewis & Brooks-Gunn, 1979). We videotaped both mirror confrontations. We found no systematic outcome differences concerning which parent—mother or father—was present during this assessment.

If the child pointed at or tried to clean his or her nose, we judged the child as having self-recognition. Otherwise, we coded the child as having no self-recognition (Bischof-Köhler, 1991).

A coder unfamiliar with the study's assumptions coded the self-recognition. Cohen's kappa, registered in a pretest with other trained coders, was .85.

## Results

### *Intracultural Variation in Father–Infant Interaction*

To verify the presence of intracultural variation in father–infant interactions, we computed a hierarchical cluster analysis with the four parenting systems—body contact, body stimulation, object stimulation, and face-to-face contact—as variables. We used linkage between groups on the basis of squared Euclidian distances as the cluster method. A sudden increase in the distance between merged clusters revealed an optimal solution of two clusters. Figure 1 shows the dendrogram, which indicates the aggregation of the 24 subjects.

Cluster 1 (11 fathers of 6 boys and 5 girls) describes a more proximal parenting style with extensive body contact. Cluster 2 (13 fathers of 6 boys and 7 girls) represents a more distal parenting style with little body contact, extensive object stimulation, and a high frequency of face-to-face contact (see Table 1). There was a statistically significant difference between the two clusters in terms of the extent of body contact and object stimulation. Although fathers in Cluster 2 showed more face-to-face contact with their infants, this difference was not statistically significant. There also was no statistically significant difference between the clusters with respect to the body stimulation system.

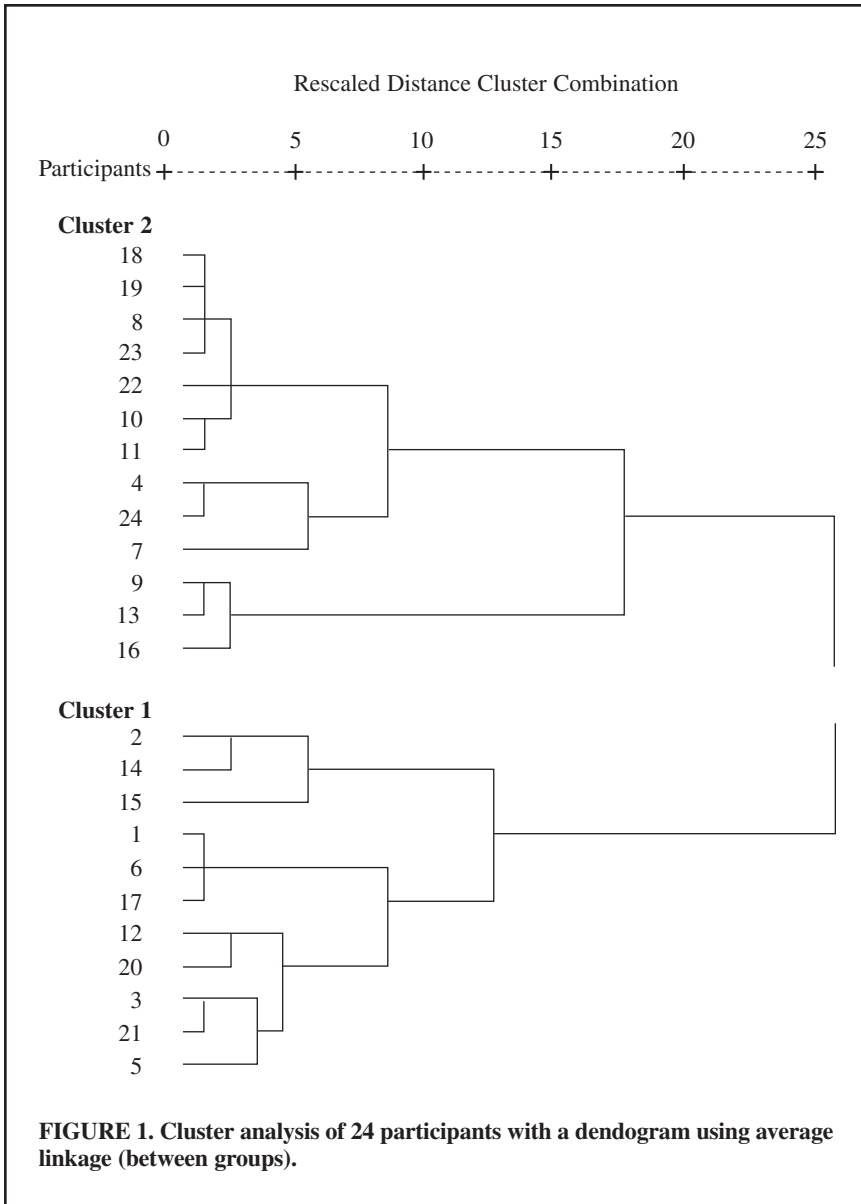
### *Cluster Differences in Sociodemographic Variables and Parental Ideas*

To analyze the differences between the two clusters on other variables, we calculated a one-way multivariate analysis of variance (MANOVA) with the cluster solution as the independent variable and the sociodemographic context variables and the parental ideas about body contact, body stimulation, object stimulation, and face-to-face contact as the dependent variables.

The clusters differed statistically significantly in fathers' years of schooling,  $F(1, 22) = 4.36, p < .05$ . The fathers in Cluster 2 (more distal parenting style) had more years of schooling ( $M = 15.46, SD = 2.96$ ) than did the fathers in Cluster 1 ( $M = 12.64, SD = 3.67$ ). There were no statistically significant differences between the clusters concerning the parental ideas of the fathers.

### *The Effect of Paternal Ideas and Behavior on Toddlers' Self-Recognition*

To test the hypothesis that father–infant interaction styles influence the development of self-recognition, we calculated a  $2 \times 2$  contingency table (see Table 2). Fisher's exact test revealed a significant relation between paternal behavior and infant self-recognition,  $p = .03$  (two-tailed; Preacher & Briggs, 2001). Nearly



85% of the children who were raised with a predominantly distal paternal style, but only 36% of the children who were raised with a predominantly proximal paternal style, were able to recognize themselves in the mirror. Thus, we correctly predicted whether a child could recognize himself or herself in the mirror in 75% of the cases by knowing the parenting style of the father.

**TABLE 1. Two-Cluster Solution (Analysis of Variance) for Paternal Behaviors**

Cluster variable	Cluster 1 <sup>a</sup>		Cluster 2 <sup>b</sup>		<i>F</i> (1, 22)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Body contact	87.16	12.10	36.17	14.67	84.20***
Body stimulation	59.44	19.19	60.67	10.19	0.04
Object stimulation	16.48	18.75	52.33	26.41	14.18**
Face-to-face contact	56.91	25.40	65.92	22.60	0.85

<sup>a</sup>*n* = 11 fathers. <sup>b</sup>*n* = 13 fathers.

\*\**p* < .01. \*\*\**p* < .001.

**TABLE 2. Contingency Between Paternal Behavior and Infants' Self-Recognition**

Paternal behavior	Development of self-recognition		Total
	Self-recognizers	Nonrecognizers	
Proximal parenting	4	7	11
Distal parenting	11	2	13
Total	15	9	24

To further analyze which elements of parenting style and paternal ideas fostered the development of self-recognition, we conducted a 2-level between-subjects MANOVA with mirror self-recognition as the independent variable and parenting behavior and parenting ideas as the dependent variables. As shown in Table 3, this analysis revealed significant differences between children who recognized themselves in the mirror and those who did not,  $F(8, 15) = 3.01, p < .05$ . Children who recognized themselves had experienced significantly less body contact from their fathers during early infancy than had children who did not recognize themselves in the mirror,  $F(1, 22) = 7.83, p < .05$ . The parenting ideas of fathers of self-recognizers focused more on face-to-face contact,  $F(1, 22) = 5.43, p < .05$ , and less on body contact,  $F(1, 22) = 4.52, p < .05$ , compared with fathers of non-self-recognizers. The mentioning of object stimulation and body stimulation in the paternal ideas did not differ between the two groups. Furthermore, tests of sociodemographic characteristics showed no differences in the gender of the child, the child's age at the second assessment, the number of children in the family, or the education of the father.

**TABLE 3. Differences Between Self-Recognizers and Nonrecognizers Concerning Parenting Experiences in Infancy and Paternal Ideas**

Variable	Self-recognizers <sup>a</sup>		Nonrecognizers <sup>b</sup>		<i>F</i> (1, 22)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Parenting behavior					
Body contact	.48	.27	.78	.23	7.83*
Body stimulation	.60	.14	.60	.17	0.00
Object stimulation	.44	.27	.23	.29	3.27
Face-to-face contact	.60	.27	.64	.18	0.17
Paternal idea					
Body contact	.04	.05	.09	.07	4.52*
Body stimulation	.07	.06	.05	.06	0.63
Object stimulation	.07	.05	.05	.05	1.86
Face-to-face contact	.06	.06	.01	.02	5.43*

*Note.* Two-level (self-recognition) multivariate analysis of variance.

<sup>a</sup>*n* = 15. <sup>b</sup>*n* = 9.

\**p* < .05.

## Discussion

German middle-class fathers interacting with their 3-month-old firstborn babies use predominantly one of two parenting styles: a more proximal style focusing on body contact or a more distal style emphasizing object stimulation and face-to-face contact. In the current study, we did not find a statistically significant difference between the two groups of fathers in terms of the amount of face-to-face contact in which they engaged with their infants. This lack of the expected difference may have resulted because we studied a German middle-class sample that can generally be expected to emphasize face-to-face contact more than would participants from other cultural environments (Keller, Lohaus, et al., 2004; Keller, Yovsi, et al., 2004; LeVine, 1995), hence making it difficult to find statistically significant differences on a relatively high level of occurrence. Similarly, we did not find the expected difference in body stimulation between the fathers' proximal and distal styles of parenting. This finding may represent fathers' general inclination toward bodily stimulation in interaction with their infants (Lamb, 1997; Yogman, 1982).

The two parenting styles were related to the level of paternal educational achievement. Thus, our study supports findings from Palacios and Moreno (1996), who demonstrated that education is a strong predictor of differences in parenting. This is in line with Kağıtçıbaşı's (1996) view that education supports individualization (see also LeVine et al., 1996).

There were no differences in paternal ideas between fathers with a more proximal parenting style and fathers with a more distal parenting style, which was surprising because of the assumption that parenting behavior is the expression of parental ideas. Some authors call this relation, which is theoretically expected but insufficiently verifiable, the *belief-behavior dilemma* and argue that it arises from theoretical and methodological problems (Davidson & Thompson, 1980; Sigel, 1992). Even if ideas and practices are assessed within the same theoretical framework with identical dimensions, the link may be missing (Eickhorst, 2002). Researchers generally regard beliefs as motivational forces to actions (D'Andrade, 1992; Lightfoot & Valsiner, 1992; Sigel, 1985). However a one-to-one correspondence between beliefs and behaviors is too simplistic in that it does not consider the "mental steps leading to the expression of intended action" (Sigel, 1985, p. 346). One way to conceive of this relation is through McGillicuddy-De Lisi's (1985) demonstration that beliefs may have an independent influence on child outcomes, in addition to their indirect effect via parental practices. Moreover, Goodnow and Collins (1990) stressed that parental ideas or beliefs encompass more than the child; that is, they encompass the parents themselves as well as the parent-child relationship.

With respect to our correlational data, we found that children of fathers with a more distal parenting style were more likely to recognize themselves in the mirror than were children of fathers with a more proximal style of parenting. Furthermore, there were differences between the parenting ideas held by the fathers of the two groups of children. The ideas of fathers of self-recognizers focused more on face-to-face contact and less on body contact than did those of fathers of non-self-recognizers. This result demonstrates that there are connections between paternal ideas and children's developmental outcomes, although the connections may not be mediated by parenting behavior, in contrast to what Sigel (1992), for example, has suggested. Super and Harkness (1994) suggested that parenting attitudes and practices independently influence children within the developmental niche by transmitting the same cultural information via different channels. More research is needed to clarify the interaction between parenting ideas and behavior in different intercultural and intracultural environments.

Although our focus in this study was on linking paternal characteristics and children's developmental outcomes, we do not deny that the whole process of family interaction—parental and child behavior as well as child development—is very complex and characterized by feedback loops between several factors (Scarr & McCartney, 1983). Although it is desirable to represent the whole process, it is often not possible within one study. However, it is also fruitful for researchers to take a closer look at parts of a complex system without denying the others. Although mothers are most often the primary caregivers during infancy, fathers' parenting behavior and ideas also can be linked to the development of self-recognition, which is an important aspect of self-development during the 2nd year of life. In this context, it is remarkable that body contact—a behavioral

pattern that for a long time researchers have not regarded as typical for paternal behavior—is an appropriate predictor of self-recognition (Clarke-Stewart, 1980). Nevertheless, in future studies, researchers should include both fathers and mothers to better understand the individual influence of each parent's behavior and ideas and the interaction between maternal and paternal influences.

One limitation of our study was the small sample size, which was due to the study's elaborate design and longitudinal character. Moreover, it is more difficult to recruit fathers for parenting studies than it is mothers. Replication with a larger sample of fathers could substantiate the long-term influences of paternal parenting on child development.

The interesting discovery of intracultural variation concerning paternal behavior needs further research attention as well. We demonstrated that the distinction between the proximal and distal styles, as described in cross-cultural literature, is apparent within one cultural environment as well.

We do not regard one or the other parenting style as better or being associated with better short- or long-term developmental outcomes for the child, but it will be interesting to study how the parenting styles influence how children grow and develop in different social, cultural, and economic contexts. Our data show that the educational attainment of the father influences the paternal parenting style but does not directly influence the child's development of self-recognition. Rather, education seems to affect the development indirectly via the paternal behavior. It would be interesting to investigate whether this is a general result or one limited to specific developmental domains. For future research, the inclusion of other subsamples with greater sociodemographic variance would also help researchers to better understand the influence of other sociodemographic parameters on parenting and on children's developmental outcomes.

#### AUTHOR NOTES

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