The impact of mother-child interaction quality and cognitive abilities on children’s self-concept and self-esteem

Markus Paulus\textsuperscript{a,*}, Maria Licata\textsuperscript{b}, Burkhard Gniewosz\textsuperscript{c}, Beate Sodian\textsuperscript{a}

\textsuperscript{a}Ludwig-Maximilian-Universität München, Munich, Germany
\textsuperscript{b}Technical University, Munich, Germany
\textsuperscript{c}Paris-Lodron-University Salzburg, Austria

ARTICLE INFO

Keywords:
Self-concept
Mother-child interaction
Emotional availability
Longitudinal
Infancy

ABSTRACT

The current longitudinal study examined relations between different dimensions of mother-child interaction quality and children’s multifaceted self-concept in \( n = 150 \) participants. Mothers’ emotional availability was assessed when children were 7 months and 4 years old. Children’s social and academic self-concept as well as their general self-worth were assessed at 8 years. Furthermore, we assessed children’s and mother’s cognitive functioning. Children’s academic self-concept was predicted by their cognitive functioning, whereas children’s social self-concept was exclusively predicted by their mothers’ early sensitivity and non-hostility. Children’s general self-worth was related to their mother’s increasing sensitivity and structuring. Overall, the current study reveals developmental pathways between the different domains of mother-child interaction quality and the different facets of children’s self-concept.

1. The impact of mother-child interaction quality and cognitive abilities on children’s self-concept and self-esteem

The self-concept, that is, how people think about and evaluate themselves, plays an important role in child psychosocial and cognitive development. A positive self-concept has been related to a variety of developmental outcomes, inter alia psychological well-being, health development, social functioning, and academic achievements (for current review see Harter, 2012; Thompson, 2008). The self-concept is a cognitive structure that comprises schemas or mental representations of the self that affect our interactions with the world and with others. Moreover, it has been suggested that the self-concept affects information processing by modulating a person’s attention and memory for particular events and information (e.g., Markus & Kitayama, 1991). Understanding the development of the self-concept is thus of interest for obtaining a full picture of human cognitive development. Interestingly, classical developmental theories propose that the self-concept is not a unitary phenomenon, but is multifaceted and hierarchically structured (Marsh & Shavelson, 1985; Shavelson, Hubner, & Stanton, 1976). For example, Harter (1982) proposed that by middle childhood children’s self-concept consists of five specific domains (for example, social competence and scholastic competence), and a distinct and more global self worth (or self-esteem) domain.

Given the significance of the self-concept for adaptive development, psychological research has been highly interested in investigating the developmental pathways that lead to a positive self-concept. Already in the early years of psychology, classical theories have proposed that the self-concept is a product of social interactions (Cooley, 1902; Mead, 1934). These views have been extended in contemporary psychology (e.g., Andersen & Chen, 2002; Brummelman & Thomaes, 2017; Orth, 2018; Shrauger & Schoeneman, 1979), and are mirrored in influential developmental theories. Most notably, attachment theory (e.g., Bowlby, 1969,
Caregiver sensitivity, i.e., the caregiver’s ability to structure the interaction in the zone of proximal development, non-intrusiveness, and non-hostility. Sensitivity focuses on genuine affect and emotional responsiveness, structuring refers to the caregiver’s ability to structure the interaction in the zone of proximal development, non-intrusiveness refers to the caregiver’s tendency to follow the child’s lead, whereas non-hostility is characterized by a lack of negativity. Empirical research has pointed to meaningful interindividual differences in parental emotional availability (e.g., Bornstein, Putnick, Heslington, Gini, & Suwalsky, 2008). Those differences in EA have been shown to be related to a number of developmental outcomes, including language development, emotional regulation, Theory of Mind development, and social functioning (e.g., Biringen, Skillern, Mone, & Piasta, 2005; Howes & Hong, 2008; Licata et al., 2014; Licata, Kristen, & Sodian, 2016; Moreno, Klute, & Robinson, 2008; Taylor-Colls & Pasco Fearon, 2015).

It should be noted that attachment theory and the concept of caregiver sensitivity are an important basis of the EA framework: Caregiver sensitivity, i.e. the caregiver’s prompt and adequate responses to the infant’s signals, is viewed as a basis for the development of a secure attachment. In addition to attachment theory, the EA framework has been influenced by other theories, such as Mahler’s theory of an available figure “being there” in the background (Mahler, Pine & Bergman, 1975) without necessarily responding in any way, as well as Emde’s (1980) idea that emotions are a barometer of the caregiver-child relationship. Thus, EA is different from mere behavioral responsiveness, focusing on emotional expressions in the interaction. Furthermore, it is assumed that each individual contributes to the relationship quality, and that child and parent mutually influence one another (Samaroff, 2009). Whereas Ainsworth’s sensitivity concept focuses on the adult, the EAS assume a stronger dyadic perspective. In sum, Ainsworth’s concept of sensitivity is one part of the EAS, but the EA framework has a broader view on sensitivity and relationship quality, and focuses on emotions instead of behavioral responsiveness. Furthermore, the EAS have been developed for a wide age range. They are applicable from infancy to adolescence, since the emotional feedback loop between child and parent is central for the EA concept, regardless of the age of the child (Biringen et al., 2014). This makes them particularly suitable for longitudinal studies.

Importantly, although the EA dimensions are intercorrelated, they show specific relations with particular outcomes. For example, maternal sensitivity and structuring are predictive of lower aggression in the kindergarten years (Biringen et al., 2005). Parental hostility, but not parenting warmth mediated relations between maternal postnatal stress and later child well-being (Giallo, Cooklin, Wade, D’Esposito, & Nicholson, 2014). Maternal intrusiveness mediated the relation between teenage motherhood and child language development (Keown, Woodward, & Field, 2001). In addition, it has been shown that maternal intrusiveness at 12 months was negatively related to child language development at 2 years (Haabrekke et al., 2015). Taken together, the different dimensions of early child-caregiver interaction quality are differently related to social and cognitive developmental outcomes, stressing thus the fruitfulness of conceptualizing caregiver-child interaction quality as a multidimensional construct.

A multidimensional approach to caregiver-child relationship quality has the potential to advance and deepen our knowledge about parental influences on the development of the self-concept. More precisely, given that the self-concept is a multifaceted phenomenon consisting of independent dimensions, we have good reasons to assume that the different aspects of the self-concept have unique developmental precursors and pathways (Harter, 2012). Understanding the emergence of the self-concept requires therefore to disclose the unique developmental pathways that shape these different facets, and reveal commonalities and differences. Given the theoretical emphasis on parent-child interaction as the cradle of children’s developing self, a multidimensional approach to caregiver quality can specify how different parent interaction characteristics affect children’s self-concept. The current study aimed at addressing this issue.

In addition, as previous research focused on the question whether or not there are any relations between the child-caregiver relationship and children’s self-concept, little is known about the developmental dynamics of this impact. Although some temporal stability in maternal characteristics has been reported, relations are mostly moderate indicating thus change over time (e.g., Bigelow et al., 2010; Biringen, Matheny, Bretherton, Renouf, & Sherman, 2000). In other words, the quality of caregiver-child relationship can change over time (for extensive discussions see Kuczynski, 2003), leading thus to the question of how the developmental dynamics of the child-caregiver relationship relates to children’s developing self-concept.

2. The current study

Taken together, the current study was designed to examine the relation between child-caregiver interaction quality and children’s self-concept in greater detail, and to shed light on the impact of developmental changes in parental emotional availability. We were specifically interested in exploring how the different facets of the child-caregiver relationship quality affect children’s self-concept. In particular, we were interested in whether or not there are specific relations between particular child-caregiver relationship characteristics and the different domains of young children’s self-concept. In addition, given the evidence of a specific impact of maternal intrusiveness on cognitive development (Keown et al., 2001), we explored whether a potential effect of maternal intrusiveness on
children’s academic self-concept is mediated by child cognitive development. The exploration of this link was warranted by theoretical considerations pointing to an impact of cognitive performances on academic self-concept (Marsh & Craven, 2006). Moreover, by assessing our predictor variables across several measurement points, we were able to not only capture a static picture, but to assess the developmental dynamics in the impact of maternal characteristics and child cognitive development on the developing self-concept.

In the current study, we assessed child-caregiver relationship quality by means of the Emotional Availability Scales (EAS) by Biringen (2008). We first assessed mothers’ EA at 7 months of age allowing us to assess the specific impact of early relationship experiences. In order to examine changes in maternal emotional availability across early childhood, we additionally assessed EA at 4 years. This allowed us to assess the impact of changes in emotional availability on children’s self-concept. We decided to focus on mother-child interaction quality to keep our study comparable to previous work on mother-child interactions. Moreover, in most German families the mother is the primary caregiving figure for young infants and we wanted to keep caregiver gender constant across participants. To assess cognitive competencies, we assessed child IQ at 4 years of age. Moreover, in order to assess the dynamic impact of changes in cognitive functioning on children’s self-concept, we additionally estimated IQ at 6 years.

As outcome variable, we administered the social self, academic self and global self-worth scales by Harter (2012) at 8 years. These scales are part of a larger test battery suitable for children between 8 and 13 years of age, and 8 years were thus the youngest age possible to administer the scales. Given that the current study’s theoretical focus was on children’s social and cognitive development, we assessed only these aspects of the self-concept and not other domains (e.g., athletic self; Harter, 1982). In addition, we used an estimator of maternal IQ (Lehrl, 2005) and child gender as control variables. It was important to control for maternal IQ as it could be a third variable affecting both child IQ and maternal interaction quality. These measures were taken from a larger, ongoing longitudinal study on social and cognitive development across early and middle childhood (e.g., Paulus et al., 2015; Sodian et al., 2016).

Based on above reviewed theoretical considerations on the impact of early relationship quality on children’s self-concept, we predicted positive relations between maternal emotional availability and children’s social self-concept and general self worth. In particular, we predicted that maternal sensitivity and non-hostility would be predictive of these aspects of the self-concept. In particular, based on assumptions that the relationship between caregiver and child serves as a prototype for later relationships (Grouf, Egeland, Carlson, & Collins, 2005), we hypothesized specific relations between a sensitive and non-hostile interaction style and the child’s social self-concept. Moreover, based on assumptions that one sees oneself through the eyes of significant others (Cooley, 1902; Mead, 1934), we hypothesize that sensitive and respectful relationships should be related to a generally higher self-esteem. Yet, we expected no such relation for maternal non-intrusiveness as non-intrusiveness focuses on letting children take the lead in their activities without interrupting them. Furthermore, we expected that children’s academic self-concept would show a different trajectory. In contrast to the social self-concept, we expected that maternal non-intrusiveness might be particularly relevant for the academic self-concept as it fosters child autonomy and independent exploration (Biringen et al., 2014). Given that non-intrusiveness affects cognitive development (Keown et al., 2001), we investigated whether child cognitive abilities would be a mediating factor between maternal non-intrusiveness and the academic self-concept.

3. Method

3.1. Sample

The study was part of an ongoing longitudinal study on social-cognitive development from infancy to childhood. The families were recruited from public birth records and mainly came from the middle class. The study initially started with a sample size of \( n = 96 \); when children were four years old, an additional sample of \( n = 59 \) children was recruited, and was included in the ongoing study. In the present study, 150 children contributed data to at least one predictor, while attendance varied across measurement points. In the present study, the following measurement points were included: At t1, children were 7 months old (\( M = 6.97, SD = 0.25 \)), at t2, children were 4 years old (WPPSI: \( M = 48.67, SD = 1.01 \); EA: \( M = 50.64, SD = 0.80 \)), at t3, children were 6 years old (\( M = 70.38, SD = 0.52 \)), and at t4, children were 8 years old (\( M = 96.23, SD = 0.62 \)). Children came from predominantly white middle-class families in an urban area in Germany. Addresses were obtained through local birth records. From the entire sample, 15.3% had attended a noncollege-bound track in the German school system, 16.1% had a highschool degree (13 years), 40.6% had a bachelor or master’s degree, and 5.2% a different degree. 22.6% did not respond to this question. Concerning family status, 1.9% reported to be a single mom, 67.1% were living in a partnership, 8.4% were separated, and 22.6% selected to not respond. The ethics committee of the Faculty of Psychology and Educational Sciences at LMU Munich approved the study (Titles: Theory of mind in infancy; Theory of mind in childhood).

3.2. Measures

At the age of 7 months and 4 years, mother-child interaction quality was assessed using the Emotional Availability Scales (EAS, Biringen, 2008). At the age of 8 years, child self-concept was assessed. As control measures, child verbal IQ (at 4 and 6 years), and maternal verbal IQ (at 8 years) were administered.

3.2.1. Mother-child interaction quality

The Emotional Availability Scales (EAS, Biringen, 2008, 4th edition) were used to assess the quality of the mother-child interaction. The following four maternal interaction characteristics were assessed. Maternal “sensitivity” focuses on genuine affect and emotional...
responsiveness to the child, but also comprises aspects like timing and flexibility in play. The dimension “structuring” assesses the mother’s ability to structure the interaction in the zone of proximal development by guiding the child and giving consistent clues without overpowering the interaction, but also setting limits when necessary. Maternal “non-intrusiveness” refers to the mother’s tendency to follow the child’s lead and offer the child the opportunity to explore the environment, whereas “non-hostility” is characterized by an overall lack of negativity in face and voice. All dimensions are rated on a 1 to 7-scale. Children’s scales were not considered for this study. At 7 months, data from 85 children were obtained. At 4 years, data from 115 children could be obtained.

The coding was done by two trained coders. In order to assure reliability, all videos were coded by a first observer, and 35% of the videos were coded by a second observer. At 7 months of age, Cohen’s Kappa resulted $\kappa = .89$ for maternal sensitivity, $\kappa = .89$ for maternal structuring, $\kappa = .83$ for non-intrusiveness, and $\kappa = .80$ for non-hostility. At 4 years of age, Cohen’s Kappa resulted $\kappa = .83$ for maternal sensitivity, $\kappa = .89$ for maternal structuring, $\kappa = .83$ for non-intrusiveness, and $\kappa = .82$ for non-hostility.

3.2.2. Child self-concept

Children’s self-perceptions of their competencies in different domains of their lives and general self-worth are assessed by the Self-Perception Profile for Children (Harter, 2012). The original scale structure consists of 5 specific domains (scholastic competence, social competence, athletic competence, physical appearance, behavioural conduct), and a separate assessment of global self-worth, from which we assessed “scholastic competence”, “social competence”, and “global self-worth”. Children are asked to rate on a 4-point scale their self-perceptions of competencies in these domains. Each of the 3 subscales contains 6 items (e.g., social domain: ‘some kids find it hard to make friends, but other kids find it’s pretty easy to make friends’), constituting a total of 18 items. The items in each domain were summed to form the score of one subscale, and then a mean score was built, with higher scores indicating more positive self-perceptions. The measure has proved appropriate reliability and validity (Harter, 2012). Internal reliability (Cronbach’s alpha) of the self-perception scores ranges from .71 to .92 (Harter, 2012). Data from 111 children were obtained.

3.2.3. Child IQ

Children’s verbal IQ was measured using several subtests of the German version of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-III, Petermann, 2009).

The WPPSI-III is a measure for preschool aged children based on the intelligence concept of David Wechsler. Consisting of 14 subtests, it can be used to assess General Intellectual Functioning, Verbal IQ, Performance IQ, Processing Speed and a General Intelligence. In our study, the subtests Similarities (verbal reasoning and concept formation) and Information were assessed at 4 years, the Vocabulary Test and the Similarities and Information subtests were administered at 6 years. Based on those subtests, a score estimating the verbal IQ was built at each measurement point. At 4 years, data from 121 children could be obtained. At 6 years, data from 120 children were obtained.

3.2.4. Maternal verbal IQ

Mothers’ verbal IQ was measured by the Multiple Choice Vocabulary Test (“Mehrfachwahl-Wortschatz-Intelligenztest”/MWT-B, Lehrl, 2005). The MWT-B is a short test which is used to estimate verbal intelligence. It is only available in German and consists of 37 items ordered from simple to difficult. Every item contains five words, of which one is a real-existing target word whereas the other four words are similar non-existing distractors (e.g. Unfision – Fudision – Infusion – Syntusion – Nuridion). The participant is asked to underline the real-existing word in every item. As one point can be obtained for every correctly answered item, the possible total score ranges from zero to 37. The measure has proved high reliability, e.g. retest-reliability after 14 months: $r = .87$ / parallel test reliability between MWT-B and MWT-A: $r = .84$, as well as high validity, e.g. correlation between MWT-B and HAWIE total IQ score: $r = .81$ (Gaschok, 2002). Data from 110 mothers were obtained.

3.3. Analyses

All major analyses were conducted using path models with Mplus 7.4 (Muthén & Muthén, 2015). Missing data were handled by the Full Information Maximum Likelihood algorithm (Arbuckle, 1996). Thus, cases with missing data were not excluded, but all model parameters were estimated based on the cases with complete data and the (conditional) missing values under the missing at random assumption. As compared to listwise deletion, this procedure does not lead to the common disadvantages, such as losing statistical power or biased parameter estimation (Graham, 2009). As a preliminary step, all variables were tested for whether missing data were completely at random applying Little’s MCAR test (Little, 1988). Missing values in all constructs proved completely at random, $\chi^2 (245, n = 150) = 240.22, p = .574$. Therefore, no biases have to be expected resulting from imputing data, for instance of 59 children who entered the study at t2.

To exploit the full potential of the longitudinal data set and to cover the developmental dynamics in the processes under investigation, the independent variables (quality of mother-child interaction and the child’s IQ) were models as state and change variables. Therefore, the idea of True Intraindividual Change (TIC) Models (Steyer, Partchev, & Shanahan, 2000) was adapted for path models. For all dimensions quality of mother-child interaction (EAS; i.e., maternal sensitivity, non-hostility, structuring, and non-intrusiveness) two points of measurement were available: at 7 months and at 6 years. The 7-month measurement served as baseline variable. In order to depict the changes in the measures over time, a latent change variable was created. This was achieved by predicting both measurements (EAS scales 7-month and 6 years) by a baseline latent variable and a change variable, only predicting the second measurement (see left-hand side of Fig. 1). The same procedure was applied to model the baseline child IQ (measured a 4 years of age) and the IQ change between age 4 and 6 years (this measurement part is not shown in the schematic model).
The dependent variables (ASC: academic self-concept, SCS: social self-concept, and GSW: global self-worth) were entered as manifest variables into the model. The baseline and change variables in regards to the quality of mother-child interaction and child IQ predicted all three outcomes. Moreover, since the child’s IQ was argued to serve as mediator between the quality of mother-child interaction and the outcomes, the EAS measures also predicted the IQ baseline and change variables. Mediated EA effects were only expected for non-intrusiveness. In order to keep the effect patterns comparable between all predictors, IQ was considered in all predictions.

For testing the indirect effect and all the beta coefficients on statistical significance, i.e. estimating the standard errors of the indirect effects, bootstrapping is an adequate method (MacKinnon & Fairchild, 2009). We used 1000 resampling cycles in order to yield distribution estimates for the model parameters. A 90% confidence limit served as lower limit for determining the significance of the direct and indirect effects. If the zero is not included in the confidence interval, the effect of interest can be considered as statistically significant.

Since the independent variables (maternal sensitivity, structuring, non-hostility, and non-intrusiveness) were highly correlated, four separate models were specified, one for each EAS dimension. The limitations will be discussed. In all reported models the child’s gender and the maternal verbal IQ were controlled.

4. Results

The following paragraphs are organized by the dimensions of the mother-child interaction quality, the major independent variable. All regression coefficients obtained in the path models are reported in Table 1.

4.1. Maternal sensitivity

The model testing maternal sensitivity effects obtained good fit statistics, \( \chi^2 (5, n = 150) = 4.74, p = .448; \) RMSEA = .00, SRMR = .02; CFI = 1.00). The T1 state maternal sensitivity positively predicted social self-concept, \( \beta = .23, \) s.e. = .14, 90%CI [.002 : .463]; see Fig. 2A. The more maternal sensitivity was shown by the mother at the child’s age of seven months, the higher the social self-concept was rated at the age of eight years. At the same time, an increase in maternal sensitivity between seven months and four years, went along with higher values in global self-worth measured at age eight, \( \beta = .25, \) s.e. = .13, 90%CI [.025 : .465]. As well the IQ state measure at age four, \( \beta = .53, \) s.e. = .12, 99%CI [.22 : .83], as the change between age four and six, \( \beta = .26, \) s.e. = .12, 95%CI [.021 : .500], positively predicted academic self-concept measured at age eight.

At the level of control variables, maternal verbal IQ was positively linked to the child’s IQ measured at age four, \( \beta = .26, \) s.e. = .10, 99%CI [.008 : .520], and negatively linked to the child’s social self-concept measured at age eight, \( \beta = -.24, \) s.e. = .10, 95%CI [.002 : .463].

4.2. Non-hostility

The model testing maternal non-hostility effects obtained good fit statistics, \( \chi^2 (5, n = 150) = 3.57, p = .614; \) RMSEA = .00, SRMR = .03; CFI = 1.00). The T1 state maternal non-hostility positively predicted social self-concept, \( \beta = .23, \) s.e. = .14, 90%CI [.001 : .449]; see Fig. 2B. The more non-hostility was shown by the mother at the child’s age of seven months, the higher the social self-concept was rated at the age of eight years. At the same time, an increase in maternal non-hostility between seven months and four years, went along with higher values in social self-concept measured at age eight, \( \beta = .22, \) s.e. = .12, 90%CI [.019 : .427]. The prediction pattern in regard to the IQ and IQ change effects on the academic self-concept as well as the control variables parallel the previously reported effects (see Table 1).
mothers became in the course of early childhood, the higher children’s unique developmental pathways between the different domains of mother-child interaction quality and the different facets of children’s self-concept were predicted in the previously reported models (see Table 1).

### 4.3. Structuring

The model testing maternal structuring effects obtained good fit statistics, $\chi^2 (5, n = 150) = 3.44, p = .633$; RMSEA = .00, SRMR = .03; CFI = 1.00). The change in maternal structuring between age seven months and four years positively predicted global self-worth measured at age eight, $\beta = .24, s.e. = .10, 90\% CI [.024: .447]$; see Fig. 2C. The more structuring by the mother was observed, the higher the levels on the child’s global self-worth were at age eight. Again, the effects of IQ and IQ change on the academic-self-concept as well as the effects of the maternal verbal IQ (control variable) were the same as in the previously reported models (see Table 1).

### 4.4. Non-intrusiveness

The model testing maternal non-intrusiveness effects obtained good fit statistics, $\chi^2 (5, n = 150) = 4.33, p = .503$; RMSEA = .00, SRMR = .03; CFI = 1.00). The T1 state maternal non-intrusiveness positively predicted the child’s IQ measured at age four, $\beta = .26, s.e. = .11, 95\% CI [.045 : .468]$; see Fig. 2D. Also, the IQ state measure at age four, $\beta = .51, s.e. = .12, 99\% CI [.185 : .833]$ as well as the change between age four and six, $\beta = .26, s.e. = .11, 95\% CI [.011 : .507]$ positively predicted academic self-concept measured at age eight. Finally, the indirect effect of maternal non-intrusiveness (state at seven months) on the child’s academic self-concept (measured age eight) through the IQ measured at age four turned out to be significant, $\beta = .13, s.e. = .07, 95\% CI [.001 : .260]$. The more non-intrusiveness in mother-child interaction at the age of seven months, the higher the IQ at the age of four was, and subsequently higher levels of academic self-concept were reported at age eight.

### 5. Discussion

The current study examined the developmental antecedents of elementary school-aged children’s self-concept. In particular, we investigated commonalities and differences in the factors that relate to children’s academic and social self-concept as well as their general self-worth. The study shows that children’s academic self-concept was predicted by their cognitive functioning, whereas children’s social self-concept was exclusively predicted by their mothers’ early sensitivity and their non-hostility. Children’s general self-worth was related to their mother’s increasing sensitivity and structuring. That is, the more sensitive and structuring their mothers became in the course of early childhood, the higher children’s general self-worth was. Overall, the current study reveals unique developmental pathways between the different domains of mother-child interaction quality and the different facets of children’s self-concept. A number of findings are noteworthy and deserve deeper discussion.

First, children’s academic self-concept was predicted by their IQ at four years and the developmental change in their intellectual abilities. That is, individual differences in children’s cognitive functioning in the early preschool years were predictive of elementary school-aged children’s academic self-concept. In particular, the higher the levels on the child’s global self-worth were at age eight. Finally, the indirect effect of maternal non-intrusiveness (state at seven months) on the child’s academic self-concept (measured age eight) through the IQ measured at age four turned out to be significant, $\beta = .13, s.e. = .07, 95\% CI [.001 : .260]$. The more non-intrusiveness in mother-child interaction at the age of seven months, the higher the IQ at the age of four was, and subsequently higher levels of academic self-concept were reported at age eight.

### Table 1

Results of the path model analyses.

<table>
<thead>
<tr>
<th></th>
<th>Wechsler IQ</th>
<th>Harter Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>Change</td>
</tr>
<tr>
<td>Gender</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Maternal verbal IQ</td>
<td>.26***</td>
<td>–.12</td>
</tr>
<tr>
<td>Sensitivity Baseline</td>
<td>.11</td>
<td>–.02</td>
</tr>
<tr>
<td>IQ Baseline</td>
<td>.16</td>
<td>–.02</td>
</tr>
<tr>
<td>IQ Change</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Gender</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Maternal verbal IQ</td>
<td>.23***</td>
<td>–.11</td>
</tr>
<tr>
<td>Non-hostility Baseline</td>
<td>.07</td>
<td>–.03</td>
</tr>
<tr>
<td>Non-hostility Change</td>
<td>.07</td>
<td>–.04</td>
</tr>
<tr>
<td>IQ Baseline</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>IQ Change</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Gender</td>
<td>.14</td>
<td>.05</td>
</tr>
<tr>
<td>Maternal verbal IQ</td>
<td>.24**</td>
<td>–.10</td>
</tr>
<tr>
<td>Structuring Baseline</td>
<td>.10</td>
<td>–.05</td>
</tr>
<tr>
<td>Structuring Change</td>
<td>.11</td>
<td>.04</td>
</tr>
<tr>
<td>IQ Baseline</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>IQ Change</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Gender</td>
<td>.14</td>
<td>.05</td>
</tr>
<tr>
<td>Maternal verbal IQ</td>
<td>.16</td>
<td>–.11</td>
</tr>
<tr>
<td>Non-intrusiveness Baseline</td>
<td>.26**</td>
<td>–.04</td>
</tr>
<tr>
<td>Non-intrusiveness Change</td>
<td>.01</td>
<td>.05</td>
</tr>
<tr>
<td>IQ Baseline</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>IQ Change</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Note: *90%CI; **95%CI; ***99%CI; * Gender effect on IQ and IQ change were not significant in all models, therefore these effects were removed from the final models, IQ: Baseline measured at 4 years, Change: 4→6 years; EAS: Baseline measured at 4 months, Change: 7 months → 4 years.
school-aged children’s perceived cognitive competence in school. Notably, the finding was specific for child IQ and independent of maternal verbal abilities. In addition, inter-individual differences in intra-individual changes in children’s cognitive functioning explained additional variance in children’s academic self-concept. That is, an increase in children’s cognitive abilities in the course of the preschool years led to a higher academic self-concept in elementary school. This indicates that academic self-concept development is an adaptive process, involving the processing of dynamic information over time. It also shows that differences in children’s cognitive abilities at four years and points thus to a developmental pathway that leads to individual differences in children’s self-concept.

Although there was no direct effect of the quality of the mother-child relationship on children’s academic self-concept, we found evidence for an indirect developmental path. Maternal non-intrusiveness at seven months was related to child IQ at four years, which – as discussed above – predicted children’s academic self-concept. Intrusiveness is defined by an over-directing and interfering parental style that undermines children’s autonomy (Biringen et al., 2014). The relation between low maternal intrusiveness and children’s high IQ provides empirical support for longstanding theoretical claims that a relationship pattern that fosters child autonomy is beneficial for children’s cognitive development (e.g., Baumrind, 1980; Erikson, 1950; Maxim, 1997; Waters, Posada, Crowell, & Lay, 1994). Given that it was particularly maternal intrusiveness at seven months that seemed to be important for child cognitive development, our results highlight that already individual differences in maternal interaction style during the first months of life bear important consequences for child cognitive development (see also Bornstein & Tamis-LeMonda, 1989).

Second, children’s social self-concept was positively related to several aspects of (early) mother-child relationship quality, most notably maternal sensitivity and non-hostility. That is, the less hostile and the more sensitive mothers were, the more positive children’s social self-concept was. These relations were independent from maternal and child cognitive abilities. Our findings relate well to theoretical proposals according to which early relationship experiences form a template through which a person evaluates her relationships with other persons (Ainsworth et al., 1978; Sroufe et al., 2005). They extend work reporting an effect of maternal sensitivity and child attachment quality on children’s social competencies (Booth, Rose-Krasnor, & Rubin, 1991; LaFreniere & Sroufe, 1985; Rose-Krasnor, Rubin, Booth, & Coplan, 1996) as well as cross-sectional work on relations between attachment and the self-concept (Cassidy, 1988) by highlighting the specific aspects of the early relationship that are most relevant: Sensitivity and non-
hostility, but not structuring and non-intrusiveness were related to a positive social self-concept. Notably, hostility is characterized by, for example, ridiculing the child and uttering pejorative comments. It prevents the development of a positive self-concept that is characterized by positive relationship experiences. In line with this, maternal hostility has been shown to be a mediating factor between parental postnatal distress and child development (Giallo et al., 2014). Our results add to this line of research by demonstrating that individual differences in early hostile behavior exert a profound influence on the internal model of the self.

The third finding concerns the predictors of children’s global self-worth, that is, their general self-esteem. This aspect of the developing self was predicted by an increase in maternal sensitivity as well as maternal structuring. That is, the more sensitive and the more structuring mothers became in the course of early childhood, the higher children’s global self-worth was. This finding corresponds to a study by Cassidy (1988) who reported a cross-sectional relation between a secure attachment pattern and children’s global self-esteem. It adds to the literature by specifying the particular aspects of the child-caregiver relationship that are most relevant for the development of a high level of self-worth. In addition, the fact that it was particularly the change in maternal structuring and sensitivity – but not its early characteristics – that predicted child self-worth points to the importance of considering the dynamics of development. The specific impact of later maternal structuring and sensitivity could be explained by the fact that an explicit concept of one’s self-worth emerges not before toddlerhood and the early preschool years (Harter, 2012). In addition, given that global self-worth is conceptually more abstract, more dynamic processes seem to be required to affect it. Our finding stresses the need to consider that the same interaction qualities exert different influences during different phases of early development.

In general, it is noteworthy that the current pattern of results suggests that the quality of the early mother-child relationship plays a pivotal role in children’s self-concept development. It was not only predictive for children’s social self-concept, it also predicted children’s global self-worth. In addition, by enhancing children’s cognitive development, it was indirectly related to children’s academic self-concept. From a theoretical point of view, our results support notions that the quality of children’s early relationships with their primary caregiver is an essential factor in their social and cognitive development (Ainsworth et al., 1978; Bowlby, 1969; Sroufe et al., 2005). In addition, our findings of differential relations between different facets of early mother-child interaction quality (sensitivity, structuring, non-intrusiveness, and non-hostility) support approaches that conceive of caregivers’ behavior as a multifaceted phenomenon, whereby each aspect has a unique impact on young children’s development (Biringen et al., 2014).

Overall, different facets of children’s self-concept were predicted by different factors. This pattern of results provides empirical support for the notion that young children’s self-concept is multifaceted (Harter, 1985). It extends current models by demonstrating the developmental antecedents that give rise to the different facets of young children’s concept, highlighting thus the unique developmental pathways that lead to the ontology of the self. Moreover, the study demonstrates that maternal influences on the child’s developing self are not static, but dynamic. Global self-worth, for instance, was exclusively explained by the changes in maternal sensitivity and structuring. Thus, some aspects of the self that conceptually are more abstract, reflecting the hierarchical structure, seem to be affected rather by maternal dynamics in mother-child interaction over time. This indicates that the generalization of the specific subdomains of the self (academic and social self-concept) into the global self-worth needs support of adaptive or dynamic interactions.

Although the current study extends on our knowledge on early self-concept development and, in particular, the impact of early mother-child relationship quality on children’s developing self, it has also some limitations. First, the current study - due to its focus on early social and cognitive development - included only a limited number of self-concept domains. For example, children’s physical self-concept was not assessed. Given that the physical self-concerns children’s bodily development, it might have different predictors. One could speculate that perceptual and motor abilities might play a greater role. Future studies are needed that encompass a greater variety of different predictors. Second, we controlled for maternal verbal abilities. Yet, we were only able to assess maternal abilities by a questionnaire at the last measurement point. Although this measure has been shown to be reliable and valid (e.g., Gaschok, 2002), future studies should include a more extensive assessment at an earlier age. Third, the current study was conducted in a Western community with families coming from middle to upper-middle class. Although it is noteworthy that even within this sample, variability in maternal behavior predicted variability in children’s self-concept, it would be interesting to examine developmental pathways of children’s self-concept also in non-Western culture and other samples with greater variance (e.g., clinical samples). We have to leave it to future research to address these issues. Finally, due to the restrictions of the sample size, the model complexity, and the intercorrelations of the dependent variables, it was not possible to test all EAS dimensions in one comprehensive model. The disadvantage is that the unique contribution of the single dimensions cannot be estimated. However, the advantage is that the shared variance between the EAS is not partialed out, which might have led to biased estimations (see, suppression effects). We consider our approach as justified, because the EAS dimension formed highly correlated, yet distinct, factors.

One further open question relates to the impact of genetic factors and, potentially more relevant in the context of our study, gene-environment interactions. The current study did not assess genetic variance and can therefore not speak to the question whether or not genetic factors play a role in the relation between mother’s emotional availability and child development. While research within attachment theory has suggested that infant attachment security is largely a product of environmental, but not genetic factors (e.g., Fearon et al., 2006; Roisman & Fraley, 2008), there is less research on the construct of emotional availability. One twin study by Robinson and Little (1994) showed that twins were not similar in their responsiveness and involvement of their mother, and that the estimates of heritability of EA were rather modest. Moreover, given that emotional availability is related to attachment security (Biringen et al., 2014), there is reason to assume that maternal emotional availability might play a primary role in shaping child development. Interestingly, it has also been reported that child cortical development relates to child involvement, whereas maternal sensitivity seemed to be more strongly related to child responsiveness (Licata, Paulus, Kühn-Popp, Meinhardt, & Sodian, 2015). Further studies are needed to explore the dynamic interplay of child and maternal factors in greater detail.

Notably, a potential impact of mother-child interaction quality on the development of child IQ and child self-concept as well as
self-esteem carries important implications for early intervention and development. More precisely, fostering caregiver-child interaction quality by focusing on its different characteristics could be an effective means to promote different facets of child development. Further research is required to assess this possibility in greater detail.

Taken together, the current study examined the developmental antecedents of children's developing self-concept. It demonstrates that individual differences in children's cognitive functioning in the preschool years predict their academic self-concept. Most notably, it shows that maternal interaction quality is predictive of children's social self-concept and their general self-worth, highlighting thus the impact of early mother-child relationship for children's development.

Acknowledgements

For help with data coding we are thankful to Sabrina Krimmel, Johannes Brass and the entire developmental lab team. This research was funded by grants from the German Research Foundation to Beate Sodian (DFG SO 213/27-1, DFG SO 213/27-2, DFG SO 213/27-3).

References


