Deutsches Institut für
Wirtschaftsforschung

DIW BERLIN

www.diw.de

SOEP The German Socio-Economic Panel Study

SOEPpapers

on Multidisciplinary Panel Data Research

242

Eva M. Berger • C. Katharina Spiess

Maternal life satisfaction and child outcomes: Are they related?

Berlin, November 2009

SOEPpapers on Multidisciplinary Panel Data Research
at DIW Berlin

This series presents research findings based either directly on data from the German Socio-Economic Panel Study (SOEP) or using SOEP data as part of an internationally comparable data set (e.g. CNEF, ECHP, LIS, LWS, CHER/PACO). SOEP is a truly multidisciplinary household panel study covering a wide range of social and behavioral sciences: economics, sociology, psychology, survey methodology, econometrics and applied statistics, educational science, political science, public health, behavioral genetics, demography, geography, and sport science.

The decision to publish a submission in SOEPpapers is made by a board of editors chosen by the DIW Berlin to represent the wide range of disciplines covered by SOEP. There is no external referee process and papers are either accepted or rejected without revision. Papers appear in this series as works in progress and may also appear elsewhere. They often represent preliminary studies and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be requested from the author directly.

Any opinions expressed in this series are those of the author(s) and not those of DIW Berlin. Research disseminated by DIW Berlin may include views on public policy issues, but the institute itself takes no institutional policy positions.

The SOEPpapers are available at
http://www.diw.de/soeppapers

ISSN: 1864-6689 (online)

German Socio-Economic Panel Study (SOEP)
DIW Berlin
Mohrenstrasse 58
10117 Berlin, Germany

Contact: Uta Rahmann | urahmann@diw.de

Maternal life satisfaction and child outcomes: Are they related?

Eva M. Berger[*] and C. Katharina Spiess[*#]

[*] German Institute for Economic Research (DIW Berlin), Mohrenstrasse 58, 10117 Berlin, Germany. Emails: eberger@diw.de, kspiess@diw.de. Phone: +49 30 89789-228; -254. Fax: +49 30 89789-109

[#] Free University of Berlin, Germany

November 2009

Abstract:

This paper investigates the association between maternal life satisfaction and the developmental functioning of two- to three-year-old children as well as the socio-emotional behavior of five- to six-year-old children. We use data from the German Socio-Economic Panel Study (SOEP), which allows us to control for a rich set of child and parental characteristics and to use the mother's life satisfaction before the birth of her child as an instrument to eliminate potential reverse causality. The results indicate that the more satisfied the mother, the better her child's verbal skills and the lower his or her socio-emotional problems. The relation is more pronounced for boys than for girls. The results are robust even when mothers' personality or mothers' cognitive skills are controlled for.

JEL classification: J13; I22

Keywords: life satisfaction, subjective well-being, mothers, children, child development, skill formation, instrumental variable

"Eine glückliche Mutter ist für Kinder segensreicher als hundert Lehrbücher über Erziehung." (Johann Heinrich Pestalozzi; in English: *A happy mother is more beneficial to children than a hundred textbooks on education.*)[1]

1 Introduction

Cognitive and non-cognitive skills play an important role in explaining differences in economic and social outcomes. Numerous studies have demonstrated their impact on educational attainment, wages, employment, and risk behavior (Anger and Heineck, 2006; Bowles, Gintis, and Osborne, 2001; Heckman and Rubinstein, 2001; Heckman, Stixrud, and Urzua, 2006). In the recent economic literature, skill formation has been modeled as a cumulative process over the life cycle (Carneiro and Heckman, 2003; Cunha et al., 2005; Cunha and Heckman, 2007, 2008; Heckman, 2007, 2008). In this model, stages of early childhood play a particularly important role because of three reasons. First, skills are self-productive, meaning that the skills developed at one stage augment those emerging at later stages. Second, sensitive periods in the life cycle make some stages of life more effective for producing certain skills than others. Here, Cunha and Heckman (2008) empirically show that parental investments in cognitive skills are more productive in early stages of childhood than in later stages. Third, the hypothesis of dynamic complementarity claims that skills produced at one stage raise the productivity of investments at subsequent stages (Cunha and Heckman 2007, 2008).

The importance of the early years of life for the formation of human capital has heightened interest among economists in explaining skill formation in early childhood. So far, economics studies have explained child outcomes by objective measures like income (Taylor et al., 2004), maternal employment (Baum, 2003; Blau and Grossberg, 1992; James-Burdumy, 2005; Ruhm, 2004; Waldfogel, 2002), and formal child care (Elder and Lubotsky, 2009; Garces et al., 2002; Hill et al., 2002; Magnuson et al., 2007).

This study contributes to the literature by investigating the role of mothers' subjective well-being (namely mothers' life satisfaction) in their children's early skill formation. This question is important because part of the effects on child outcomes found by other studies might be driven by maternal well-being. For instance, some psychologists (e.g., Nunner-Winkler, 2000) assume that it is not the mother's employment but rather her satisfaction with life that affects a child's development. This means that the quality of parental investments in children can be measured not only by objective factors like employment or child care hours but also by parents' subjective well-being.

Measures of subjective well-being have traditionally been used by psychologists to analyze the impact of major life events on individual well-being (e.g., Diener et al., 2006; Lucas, 2008; Lucas and Donnellan, 2007). In the last twenty years, happiness research has been growing not just in sociology and psychology

[1] We are grateful to Friedhelm Pfeiffer who made us aware of this quotation.

but also in economics, where the role of factors like income and unemployment has been analyzed (for an overview, see Di Tella and MacCulloch, 2006; Dolan, Peasgood, and White, 2008; Frey and Stutzer, 2002a, 2002b; Layard, 2005; Van Praag and Ferrer-i-Carbonell, 2004).

Yet to our knowledge no economic study to date has addressed the question of how child outcomes might be related to mothers' subjective well-being. However, several psychological studies investigated the effects of a pathological form of low subjective well-being, namely postnatal depression, on child outcomes (for recent surveys, see Wiegand-Grefe et al., 2009; Zimmer and Minkovitz, 2003). They found that depression and depressive symptoms have deleterious effects in several domains: the mother-child relationship, parenting practices, family functioning, and the child's general development. Depression, however, is a very extreme form of individual well-being (very low well-being). In this study, we refer to self-reported well-being data from a broader (nationally representative) group of mothers with young children from the German Socio-Economic Panel Study (SOEP). We focus on mothers' rather than on fathers' well-being because in most cases the mother is still the main caregiver for the young child.

The paper is organized as follows: in Section 2 we explain the underlying mechanisms through which mothers' subjective well-being might affect children's skill formation. In Sections 3 we describe the data set and in Section 4 we present the empirical framework. The results and robustness tests are presented and discussed in Section 5. In Section 6 we outline our conclusions.

2 Mechanisms by which mothers' subjective well-being could affect child development

This paper addresses the question of whether mothers' overall life satisfaction is associated with child developmental functioning and non-cognitive skill outcomes. In this section we discuss the mechanisms that might be responsible for the possible association. From a psychological point of view, one reason might lie in the attachment between the mother and the child. The attachment theory in the developmental psychology research states that the mother-child relationship plays a crucial role in the young child's development (for references to this theory, see Bowlby, 1969; Cicchetti et al., 1995; Grossmann and Grossmann, 1995). More concretely, the *quality of the attachment* between child and caregiver influences child development. A child's attachment behavior is formed largely during the first year of life and depends on the caregiver's *sensitivity* and *responsiveness* in social interactions with the infant (Grossmann and Grossmann, 1996; Sroufe, 1990). A mother's sensitivity and responsiveness, in turn, is influenced by *distal factors* like her *psychological well-being* (Belsky, 1997). Studies on small, selective samples have shown that mothers who report lower levels of positive affectivity also show lower levels of attachment (Adam et al., 2004). Further, Belsky (1984) points out that parental stress is a risk factor in their children's development. Moreover, the attachment theory posits that the quality of the attachment has different effects on various child outcomes

such as the child's intelligence, verbal skills (Korntheuter et al., 2007; for a meta-analysis, see van Ijzendoorn et al., 1995), and socio-emotional behavior (Gloger-Tippelt et al., 2007).

To directly analyze the effect of the attachment quality on child outcomes, we would need a measure of attachment quality. However, to our knowledge, there is no large and representative data set available that contains such a measure. However, a mother's overall subjective well-being can serve as a proxy for attachment quality, since the attachment theory suggests that more satisfied mothers are more sensitive and responsive to their children and therefore form higher-quality attachments with their children.

Another explanation for mothers' life satisfaction affecting child outcomes might be the number and quality of activities mothers undertake with their children.[2] Felfe and Hsin (2009) assume the same underlying mechanism for an explanation why maternal work characteristics may influence children's development. In our case, more satisfied mothers might spend more time on activities with their children (reading, playing, going for walks, etc.) than less satisfied mothers. Or mother/child interactions during the same activity might be more intense (of better quality) if the mother is satisfied. Reissland et al. (2003) found a significant relation between the mother's psychological well-being and the quality of her reading and speaking to the child during picture-book sessions. Again, to our knowledge, large and representative surveys do not provide sophisticated measures for the frequency of joint activities or the quality of the mother/child interaction during such activities. However, the SOEP survey used here offers a crude measure of the frequency of some specific activities that mothers undertake with their children. Hence we are able to—at least partly—address the question of whether the frequency of activities with the child is one of the underlying mechanisms determining the relationship between maternal life satisfaction and child outcomes.

The above discussion gives various explanations as to why mothers' life satisfaction might affect their children's developmental outcomes. However, the reverse could be true as well, that is, a child's development could affect the mother's life satisfaction. On the one hand, one might think of a case where the mother is worried about her child's slow development and her overall life satisfaction decreases as a result. On the other hand, a mother who is very proud of her child's positive development might report higher overall well-being. Thus the analysis carried out here has to deal with the problem of reverse causality. We address this issue methodologically with an instrumental variable approach, using as an instrument the mother's life satisfaction before the birth of the child (for more details, see Section 4).

---

2 We do thank Dieter Wolke, Department of Psychology and Health Science Research Institute, Warwick Medical School, who suggested that this might be another potential mechanism.

3 Data

Our empirical analysis is based on data from the German Socio-Economic Panel Study (SOEP), a representative annual household panel study started in 1984. The most recent wave covers about 20,000 respondents from 11,000 households.[3] In 2003, a new series of questionnaires for surveying the development of children from the very beginning of their lives was implemented in the SOEP. The first of these questionnaires (Q1) is given to mothers of newborn children and was first implemented in 2003. It collects information about health, child-care arrangements, and changes in the parents' living situation since the birth of the child. Since the 2003 wave, the questionnaire has been distributed to all mothers who gave birth in the year of the survey or the year before. In 2005, a follow-up questionnaire (Q2) was distributed to mothers of children aged two to three years old and has been administered to all mothers with children in this age group every year since 2005. It gathers information on the child's skill development as well as on health, child care arrangements, and the mother's activities with the child. The most recent follow-up questionnaire (Q3) was introduced in 2008 to collect data about children aged five to six years old.[4] It collects information on the child's socio-emotional behavior, health, child care arrangements, and the mother's activities with the child.

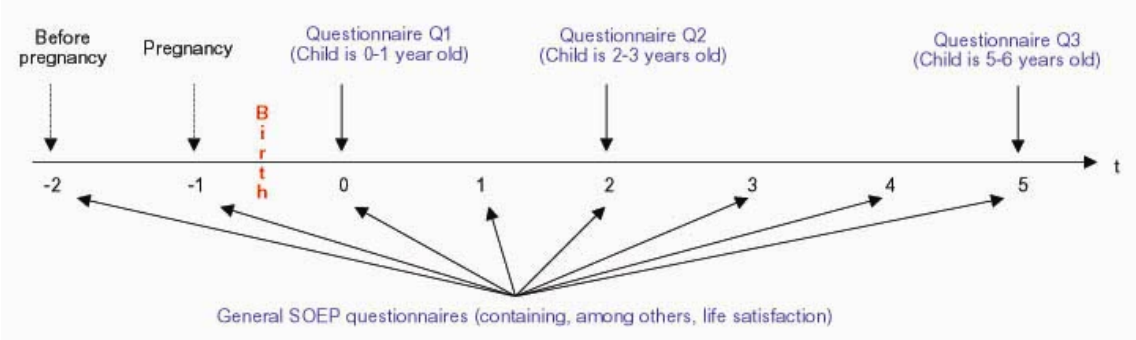
In this study, we use data from all of the new SOEP mother-child questionnaires (Q1, Q2, and Q3). In order to control for socio-economic and demographic characteristics, we also use personnel and household-specific data from the main SOEP survey referring to periods before and after the birth of each child. Figure 1 illustrates the time horizon of the data used in our analysis. Period t indicates the point in time with respect to the birth of the child. Period t = 0 indicates the period when the child was a newborn and when questionnaire Q1 was answered by the mother. In period t = 2, that is, when the child was two to three years old, questionnaire Q2 was answered, which contains our first set of child outcome measures. In our sample, the total number of observations for t = 2 is 764 (after dropping observations with missing values in some variables). Period t = 5 indicates the period when the child was five to six years old and questionnaire Q3 was filled out, which contains our second set of child outcome measures. The sample size for t = 3 is 159 (again after dropping observations with missing data). This sample is much smaller due to the fact that the collection of data for five- to six-year-olds started in the year 2008 and thus only one cohort is available yet. The periods t = -1 and t = -2 refer to the time before the birth of the child, that is, when the woman was pregnant (in most cases), t = -1, and before the woman became pregnant, t = -2.

---

[3] For more information about the SOEP, see Wagner et al. (2007).

[4] For more information about the mother-child questionnaires in the SOEP, see Schupp et al. (2008) and Siedler et al. (2009).

Figure 1. Time horizon of the data



In the following subsection, we present the child outcome measures, the measure of maternal life satisfaction, and the control variables we use in our analysis.

3.1 Child outcome measures

Given the information in the SOEP, we use two types of child outcome measures: A measure for the adaptive behavior of two- to three-year-old children and a measure of the socio-emotional behavior of five- to six-year-old children.

The adaptive behavior of the two- to three-year-old children is measured with a modified version of the German Vineland Adaptive Behavior Scale (VAB) proposed by Sparrow et al. (1984). We construct so-called "VAB scores" using a total of 20 items.[5] The items refer to the skill attainment of a child in four domains: verbal skills, activities of daily living, motor skills, and social skills. We use the four domain-specific VAB scores, which are each based on five items, as well as a total VAB score, which is the sum of the four domain-specific scores.[6] Appendix A provides the relevant items from SOEP questionnaire Q2 (English translation). The four domain-specific VAB scores range from 0 to 10, the total VAB score ranges from 0 to 40. Table 1 gives descriptive statistics for the four domain-specific VAB scores; Figure 2 illustrates the distribution of the total VAB score. The latter is shown to be roughly bell-shaped, though being slightly skewed to the right.

[5] For a detailed description of this measure in the SOEP, see Schmiade et al. (2008)

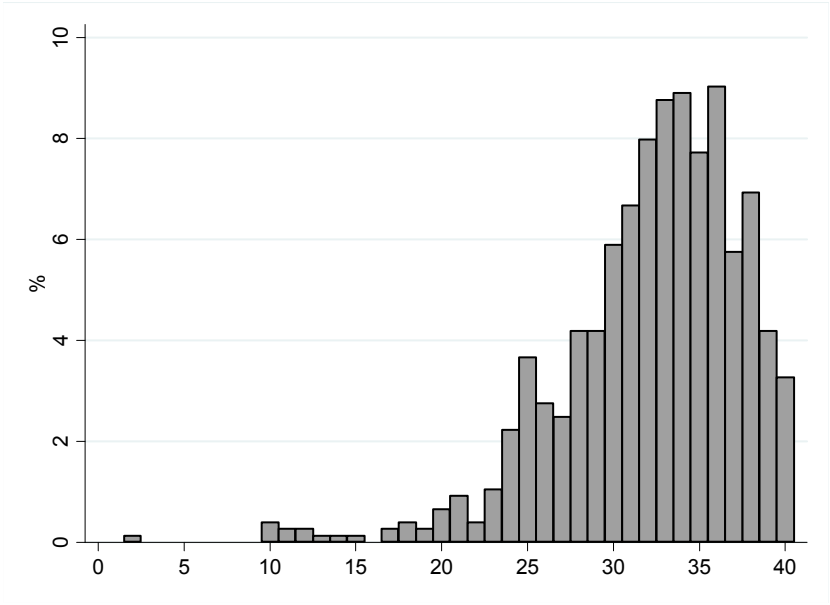
[6] For other studies using the VAB scores in the SOEP, see Cawley and Spiess (2008), Coneus and Pfeiffer (2007), and Coneus and Sprietsma (2009).

Table 1: Descriptive statistics of the four domain-specific VAB scores

	Mean	Percent "0"	Percent "10"	s.d.
Verbal skills	8.97	0.13	49.74	1.51
Activities of daily living	6.35	0.79	9.95	2.37
Motor skills	8.07	0.26	22.51	1.76
Social skills	8.79	0.13	45.68	1.56

Note: Data from the SOEP (2005-2008), authors' calculations, N = 764.

Figure 2. Distribution of the total VAB score



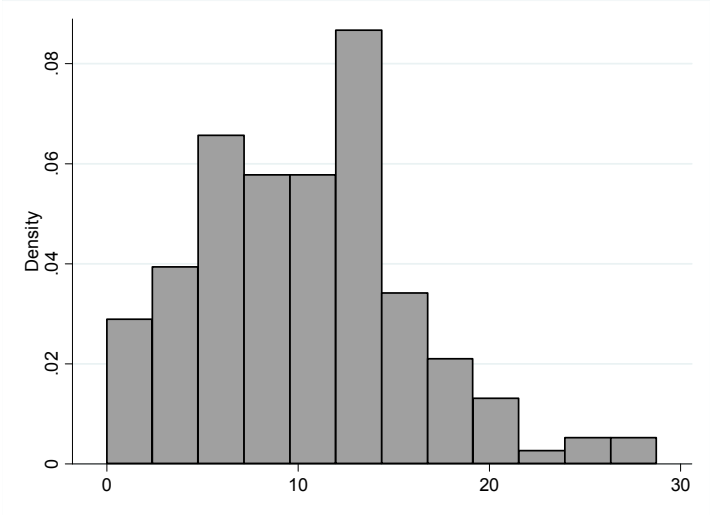
Note: Data from the SOEP (2005-2008), authors' calculations, N = 764.

The second measure of child outcomes—the socio-emotional behavior (SEB) of five- to six-year-old children—is based on a modified version of the Strength and Difficulties Questionnaire (SDQ) proposed by Goodman (1997). The SOEP version of the SDQ contains 17 items referring to five dimensions: emotional symptoms (3 items), conduct problems (2 items), hyperactivity/inattention (4 items), peer relationship problems (4 items), and prosocial behavior (4 items)[7]. Appendix A provides the relevant items of SOEP questionnaire Q3 (English translation). The scores of the first four dimensions are added together to generate the Total Difficulties Score. Taking on values from 0 to 40, its distribution is illustrated in Figure 3. We further generate the binary variable "normal" taking on the value 1 if the Total Difficulties Score is between 0 and 13 (the child is "normal" according to the concept of Goodman, 1997) and the value 0 if the Total

[7] The modified version of the Strength and Difficulties Questionnaire (SDQ) is a slightly reduced version of the original SDQ scale. The reduction of the items is based on results of pretest data and factor analysis.

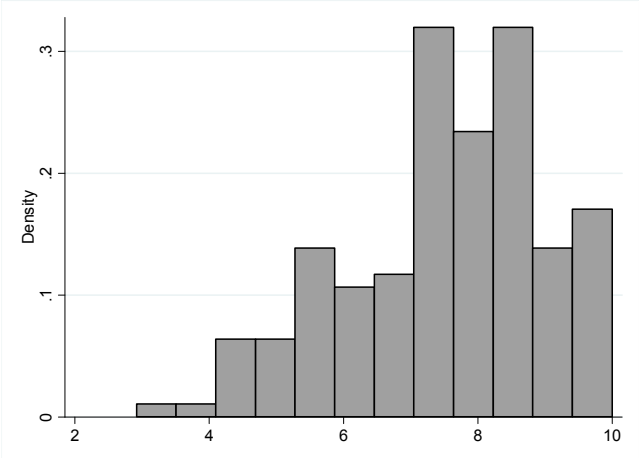
Difficulties Score is 14 or larger (the child is "borderline" or "abnormal" according to Goodman, 1997). In our sample we find that the child is classified as "normal" in 69.2% of the cases. The score of the fifth dimension, the Prosocial Behavior Score, ranges from 0 to 10; its distribution is illustrated in Figure 4.

Figure 3. Distribution of the Total Difficulties Score



Note: Data from the SOEP (2008), authors' calculations, N = 159.

Figure 4. Distribution of the Prosocial Behavior Score



Note: Data from the SOEP (2008), authors' calculations, N = 159.

3.2 Mothers' subjective well-being

The explanatory variable of main interest in this study is mother's subjective well-being. We use an 11-point life satisfaction measure based on the SOEP question "How satisfied are you with your life, all things considered?". Respondents were instructed to choose a number ranging from 0 (completely dissatisfied) to 10 (completely satisfied). The variable is available at each period t relevant for our analysis, that is, in the

periods from t = -2 to t = 5. We use different specifications of the life satisfaction variable in our estimation models. First, we use *contemporaneous life satisfaction*, that is, life satisfaction in the same period in which the child outcome is measured. This is life satisfaction at t = 2 (denoted by LS_2) when estimating the VAB of two- to three-year-old children and life satisfaction at t = 5 (denoted by LS_5) when estimating the SEB of five- to six-year-old children. Second, we use the *one-year-lagged life satisfaction* score LS_1 and LS_4 for the VAB and the SEB estimation, respectively. In a third specification we use the *mothers' life satisfaction in the child's first year of life* (denoted by LS_0). Fourth, we use *mean life satisfaction* over the periods after the birth of the child, that is, the mean over the periods t = 0 to t = 2 (denoted by $LS_{\overline{02}}$) for the VAB estimation and the mean over the periods t = 0 to t = 5 (denoted by $LS_{\overline{05}}$) for the SEB estimation. In order to address the issue of reverse causality, we estimate a fifth and a sixth specification of the models, where we use *life satisfaction before pregnancy* (denoted by LS_{-2})[8] as an instrument for the contemporaneous life satisfaction and for the mean life satisfaction, respectively. Table 2 presents descriptive statistics of the different life satisfaction variables.

Table 2. Descriptive statistics of the life satisfaction variables

	Mean	s.d.	N
LS_5	7.21	1.60	159
LS_4	7.24	1.63	156
LS_2	7.27	1.62	764
LS_1	7.22	1.68	751
LS_0	7.51	1.59	726
LS_{-2}	7.47	1.53	616
$LS_{\overline{05}}$	7.29	1.28	150
$LS_{\overline{02}}$	7.34	1.33	716

Note: Data from the SOEP (2001-2008), authors' calculations.

3.3 Control variables

In our regression models we control for a number of socio-economic and demographic characteristics related to the mother and the child.[9] Control variables related to the mother are age, age squared, highest educational degree (in the categories university degree, vocational degree, no professional degree), partner's highest educational degree (categories university degree, vocational degree, no professional degree, no

[8] We go back to the period before pregnancy (t = -2) and not only the last period before birth (t = -1) in order to avoid that mothers' well-being during pregnancy might already be influenced by child characteristics.

[9] There is a broad literature on the relevance of socio-demographic and socio-economic variables for child development. For some studies see chapter 1 or the literature overview by Bradley and Corwyn (2002).

partner in household), employment status (not employed, employed part-time, employed full-time), inflation-adjusted net household income (in Euros per month), and an indicator of whether a language other than German is usually spoken in the household.[10] Covariates related to the child are age in months, age squared, gender, a dummy indicating whether the child has had a disease or dysfunction, and the number of hours per week the child spends in a day-care center or in family day care. Descriptive statistics of the control variables are given in Tables B1 and B2 in Appendix B.

4 Empirical Framework

4.1 Estimation of the adaptive behavior of two- to three-year-old children

To analyze the association between mothers' life satisfaction and the adaptive behavior (VAB scores) of two- to three-year-old children, we estimate the following equation

$$VAB_j = \alpha_{jt} LS_t + \beta_{jt} X + \varepsilon_{jt} \tag{1}$$

by least squares, where VAB_j is the VAB score for domain j, $j \in \{verbal, daily, motor, social, total\}$ (see Section 3.1), LS_t is the life satisfaction at period t, $t \in \{2,1,0,\overline{02}\}$ (see Section 3.2), X is a set of control variables (see Section 3.3), and ε_{jt} is an error term.

The parameters α_{jt} and β_{jt} can be estimated consistently if the error term ε_{jt} is exogenous to LS_t, given X. This is not the case if the effect is reverse causal. If a child who is developing well (high VAB scores) makes her mother very proud and therefore the mother reports higher life satisfaction, α_{jt} will not be estimated consistently. This would mean that LS_t does not affect VAB_j but vice versa. Expressed formally, if ε_{jt} contains "maternal pride," which is higher for a child's higher VAB_j and which is at the same time correlated with the reported life satisfaction LS_t, α_{jt} will be biased. Assuming that pride is positively correlated with both VAB_j and LS_t, OLS estimation produces upward biased estimators of α_{jt}. To address this problem, we instrument LS_t, $t \in \{2,\overline{02}\}$ by LS_{-2}, which is the life satisfaction of the mother in the period before she became pregnant with the child.[11] This variable is uncorrelated with her later pride in the child's positive developmental outcomes. Moreover, LS_{-2} is usually highly correlated with LS_t, $t \in \{2,\overline{02}\}$ and is therefore a strong

[10] In a sensitivity check, we used the nationality or the country of birth to control for migration background instead of foreign language. This did not change our core result.

[11] For the general use of instrument variables techniques, see, for example, Greene (2008) or Wooldridge (2009).

instrument.[12]

Apart from the problem of reverse causality, the IV estimation also removes all potential bias due to changes that have affected the family since the birth of the child and that might have influenced both the mother's life satisfaction and her child's development.

Further, the IV approach remedies the problem of measurement error in the explanatory variables, which plays an important role in the context of our analysis. One reason why measurement error is an important issue here is that the observed variable LS_t is a mother's evaluation of her life satisfaction at a specific day in period t, while we intend to measure her *overall* and *true* life satisfaction *during the whole period* (year), which could be denoted by LS_t*. It is this latter unobserved variable which is hypothesized to be related to child development rather than LS_t, which might be more fluctuating being effected by random factors like the weather. LS_t can only serve as a proxy for the latent variable LS_t*. The problem of measurement error can be formally described as follows. We intend to estimate the following equation

$$VAB_j = \alpha_{jt} LS_t^* + \beta_{jt} X + \varepsilon_{jt}. \tag{2}$$

The observed life satisfaction score LS_t is related to LS_t* according to

$$LS_t = LS_t^* + \zeta_t, \tag{3}$$

where ζ_t is an error term, namely the measurement error. Substituting equation (3) into equation (2) yields

$$VAB_j = \alpha_{jt} LS_t + \beta_{jt} X + (\varepsilon_{jt} - \alpha_{jt}\zeta_t). \tag{4}$$

Even if the measurement error ζ_t is independent of LS_t*, estimating equation 4 by ordinary least squares will produce an inconsistent estimator of α_{jt} because the regressor LS_t is correlated with the error term ω, where $\omega = \varepsilon_{jt} - \alpha_{jt}\zeta_t$, through ζ_t. Since ω is negatively correlated with LS_t, the OLS estimator of α_{jt} will be biased towards zero (attenuation bias).[13] In contrast, instrumenting LS_t by LS_{-2} will produce consistent estimates under the assumption that ζ_{-2} is independent of ζ_t, $t \in \left\{2, \overline{02}\right\}$.

As illustrated, the IV approach remedies the issue of reverse causality and that of measurement error in the life satisfaction variable. However, there could still be unobserved heterogeneity that affects both the

---

[12] Estimating the equations $LS_2 = \pi_1 LS_{-2} + \pi_2 X + \upsilon_1$ and $LS_{\overline{02}} = \pi_3 LS_{-2} + \pi_4 X + \upsilon_2$, we obtain π_1 = 0.4132 (0.0410) and π_3 = 0.3948 (0.0366). This proves that LS_{-2} is partially correlated with LS_2 and $LS_{\overline{02}}$, which is a precondition for using LS_{-2} as an instrument.

[13] For a more detailed description of the impact of measurement error in explanatory variables, see, for example, Greene (2008), chap. 5.

mother's baseline level of life satisfaction (i.e., even life satisfaction before pregnancy) and her child's developmental outcomes. If such unobserved heterogeneity exists, even the IV estimates will be biased. This is why we cannot ultimately claim to identify a causal effect, although we conduct several robustness tests to exclude some concrete sources of heterogeneity that might be driving our findings.

4.2 Estimation of the socio-emotional behavior of five- to six-year-old children

For our analysis of the socio-emotional behavior (SEB) of five- to six-year-old children, we estimate

$$SEB_j = \gamma_{jt} LS_t + \delta_{jt} X + \nu_{jt} \tag{5}$$

by OLS if *j=1,* where SEB_1 = *Total Difficulties Score*. We estimate equation (5) by a binary probit model if *j=2,* where SEB_2 = *normal* (a dummy variable taking on 1 if the child is classified as "normal" and 0 if it is classified as "borderline" or "abnormal"). If *j=3,* where SEB_3 = *Prosocial Behavior Score*, we estimate equation (5) by OLS. LS_t in equation (5) is life satisfaction in specification *t,* $t \in \left\{5, 2, 0, \overline{05}\right\}$.

In a further step, we again instrument LS_t ($t \in \left\{5, \overline{05}\right\}$) by LS_{-2} in order to remove the reverse causality problem and at the same time the attenuation bias due to measurement error.[14]

5 Estimation Results

5.1 Maternal life satisfaction and the adaptive behavior of two- to three-year-old children

Table 3 gives the results of the estimations of the four domain-specific and the total VAB scores. The models include the mother's contemporaneous life satisfaction and the set of control variables described in Section 3.3. The coefficient related to the mother's life satisfaction is significantly positive for the estimations of verbal, motor, and social skills as well as for the total VAB score. This suggests that more satisfied mothers have children with better verbal, motor, and social skills. Note that in Table 3, life satisfaction is the maternal characteristic most clearly correlated with child outcomes (in terms of significance)—even more than parental education or income.

[14] Estimating the equations $LS_5 = \theta_1 LS_{-2} + \theta_2 X + \psi_1$ and $LS_{\overline{05}} = \theta_3 LS_{-2} + \theta_4 X + \psi_2$ by least squares, we obtain θ_1 = 0.2860 (0.0696) and θ_3 = 0.3819 (0.0598). This proves that LS_{-2} is partially correlated with LS_5 and $LS_{\overline{05}}$.

Table 3. Estimation of the VAB scores of children aged two to three years

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score
Characteristics of the mother/household:					
LS_2	0.122**	0.064	0.115**	0.068+	0.369**
	(0.039)	(0.054)	(0.040)	(0.037)	(0.119)
Age of mother	-0.083	-0.081	-0.012	0.071	-0.105
	(0.098)	(0.142)	(0.118)	(0.104)	(0.327)
(Age of mother)^2	0.001	0.001	0.000	-0.001	0.001
	(0.001)	(0.002)	(0.002)	(0.002)	(0.005)
Education (Ref is vocational degree):					
University degree	0.144	-0.110	0.061	-0.026	0.068
	(0.128)	(0.225)	(0.173)	(0.137)	(0.488)
No professional degree	-0.270	0.614*	0.099	-0.109	0.334
	(0.178)	(0.248)	(0.193)	(0.176)	(0.559)
Education of partner (Ref is vocational degree):					
Partner university degree	0.238+	-0.234	-0.046	-0.122	-0.165
	(0.138)	(0.219)	(0.176)	(0.152)	(0.501)
Partner no professional degree	-0.077	-0.038	-0.235	-0.204	-0.554
	(0.186)	(0.296)	(0.258)	(0.217)	(0.715)
No partner	-0.214	0.354	0.434+	-0.125	0.449
	(0.211)	(0.307)	(0.231)	(0.214)	(0.666)
Employment status (Ref is not employed):					
Part-time employed	0.206+	0.311+	0.273*	0.032	0.821*
	(0.125)	(0.178)	(0.131)	(0.131)	(0.407)
Full-time employed	0.031	0.682**	-0.106	-0.026	0.581
	(0.180)	(0.261)	(0.228)	(0.177)	(0.637)
Household income (in logs)	-0.149	0.028	0.409*	0.203	0.491
	(0.186)	(0.244)	(0.199)	(0.178)	(0.640)
Other language	-0.285+	0.071	-0.185	-0.056	-0.455
	(0.167)	(0.221)	(0.166)	(0.160)	(0.530)
Characteristics of the child:					
Age of child	0.422**	0.664**	0.317+	0.449**	1.852**
	(0.143)	(0.222)	(0.176)	(0.167)	(0.432)
(Age of child)^2	-0.005*	-0.007*	-0.003	-0.006*	-0.020**
	(0.002)	(0.003)	(0.003)	(0.002)	(0.006)
Child is male	-0.166	-0.984**	-0.053	-0.439**	-1.643**
	(0.102)	(0.152)	(0.118)	(0.108)	(0.340)
Disease / dysfunction	-0.229*	-0.099	-0.166	-0.013	-0.508
	(0.112)	(0.153)	(0.122)	(0.114)	(0.362)
In formal child care: hrs per week	0.004	0.024**	0.005	0.017**	0.050**
	(0.004)	(0.006)	(0.005)	(0.004)	(0.014)
Constant	2.116	-6.868	-3.119	-2.980	-10.852
	(3.239)	(4.894)	(3.827)	(3.408)	(10.436)
N	764	764	764	764	764
Adjusted R^2	0.111	0.215	0.114	0.083	0.202
F	6.066	16.310	7.607	5.467	12.986

Note: Results from least squares estimations of the VAB score indicated in the top of each column. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (2001-2008).

From these results, however, it is not possible to determine whether the effects are causal (that is, the skills are higher *because* the mother is more satisfied), reverse causal (the mother is more satisfied because the skills of the child are highly developed), or whether there are unobserved confounding factors that influence both the children's skill attainment and mothers' life satisfaction. Examples of such confounding factors could be the mother's personality or her cognitive ability. We will return to this aspect in Section 5.2.

To address the issue of reverse causality we estimate different specifications of the models using, instead of contemporaneous life satisfaction (LS_2), lagged life satisfaction (LS_1 and LS_0) and mean life satisfaction ($LS_{\overline{02}}$), and also applying an IV approach. The results are summarized in Table 4. Each cell in the table contains the results of a separate regression of the child outcome variable (given at the top of each column) on the life satisfaction variable (given in the rows). All models additionally contain the variables controlled for in the estimations given in Table 3. For the sake of brevity, the estimated coefficients of the control variables are not presented in this or any of the following tables.

Life satisfaction lagged one year (LS_1) and life satisfaction in the child's first year of life (LS_0) are both also significant predictors for the children's verbal, motor, and social skills as well as for the total VAB score. Note that LS_1 seems to be a weaker predictor of child developmental outcomes in t=2 than LS_2, while the coefficients related to LS_0 are even larger and "more significant" than those related to LS_2. Since attachment behavior develops mainly in the first year of life, this result suggests that attachment quality might be the underlying mechanism. We estimate a fourth specification of the model introducing the mean life satisfaction, $LS_{\overline{02}}$. This variable turns out to be the best predictor (among the life satisfaction variables) of the verbal, motor, and social skills as well as of the total VAB score. This suggests that the constant level of maternal life satisfaction plays an important role in their children's development. This could be due to the attachment quality that develops to a large extent in the first but also in the following years of the child's life, but other mechanisms could also play a role. We will come back to the question of the underlying mechanism in Section 5.3 in this paper.

To exclude the possibility of reverse causality of our results, we estimate an IV model using maternal life satisfaction before pregnancy as an instrument for LS_2 and $LS_{\overline{02}}$. The results are given in rows 5 and 6 of Table 4. The coefficients are again significantly positive for verbal and motor skills and even larger than the coefficients estimated by OLS. This suggests that the relationship was not (or at least not predominantly) upward biased due to reverse causality but rather downward biased (i.e., attenuated) due to measurement error in the life satisfaction variable. Only the coefficient for social skills (column 4) is no longer significant in the IV models. One explanation could be that reverse causality plays a role in the estimation of the social skill score. However, since the point estimates in the IV models have not decreased much in magnitude compared to the OLS results, while only the standard errors have increased sharply due to the generally

lower efficiency of IV estimations, one should be cautious with interpretation here. In any case, the relationship for verbal and motor skills is found to be more robust.

Table 4. Estimation of the VAB scores, different specifications of mothers' life satisfaction

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
LS_2	0.122**	0.064	0.115**	0.068+	0.369**	764
	(0.039)	(0.054)	(0.040)	(0.037)	(0.119)	
LS_1	0.096*	-0.006	0.083*	0.062+	0.235*	751
	(0.038)	(0.051)	(0.038)	(0.037)	(0.117)	
LS_0	0.155**	0.033	0.109*	0.125**	0.422**	726
	(0.045)	(0.055)	(0.050)	(0.045)	(0.151)	
$LS_{\overline{02}}$	0.188**	0.019	0.153**	0.126*	0.486**	716
	(0.050)	(0.069)	(0.053)	(0.051)	(0.169)	
LS_2 (IV)	0.388**	-0.044	0.262*	0.109	0.714*	604
	(0.124)	(0.139)	(0.112)	(0.110)	(0.343)	
$LS_{\overline{02}}$ (IV)	0.397**	-0.081	0.267*	0.115	0.698+	592
	(0.131)	(0.147)	(0.118)	(0.117)	(0.366)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of controls listed in Table 3. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (2001-2008).

In order to illustrate the magnitude of the estimated association of mothers' life satisfaction and children's verbal skills, we express the results in terms of "equivalent age variations" (E*AV*). An equivalent age variation gives the number of months of age that are predicted to increase the child's skills to the same extent as one point (or one standard deviation) in the mother's life satisfaction. We use the age of the child for the illustration of the magnitude of the effects because age turned out to be a very good predictor for most VAB scores. This can be seen from the highly significant coefficients related to age in Table 3. The calculation of equivalent age variations suggests that one month of age increases the verbal score of a child at mean age (33.25 months) by 0.09. Hence, an increase in mother's life satisfaction (LS_2) by one point on the 11-point scale is equivalent to the child aging about 1.4 months ($EAV = 0.122/0.09 = 1.363$; cf. Table 5, column 1). Increasing a mother's life satisfaction by one standard deviation (= 1.623 points) is equivalent to the child aging 2.2 months (Table 5, column 2). When we refer to $LS_{\overline{02}}$ instead of LS_2, the *EAV*s are even higher, namely 2.7 and 3.6 months, respectively. The *EAV*s based on the IV estimates are much higher. Since measurement error makes the OLS estimates to be biased toward zero, we trust the IV estimates rather than the OLS coefficients. Increasing a mother's mean life satisfaction by one point (one standard deviation)

would then be equivalent to a child aging 6.4 months (8.5 months). Given that half a year is a very long time in the life of a two- to three-year-old child, the magnitude of this result is remarkable. The comparison with the effect of age is not meant to suggest that the effect of low life satisfaction is compensated for as the child grows older. On the contrary, due to the self-productivity of early skills and given that there might be sensitive periods for the acquisition of some skills, the effects might be even larger in the long run.

A similar interpretation of the effect of maternal life satisfaction on motor skills in terms of an equivalent age variation is not possible because age is not found to have a significant effect on motor skills in most of our specifications (in Table 3 age is significant on the 10% level; in the IV estimations of motor skills—not shown here—the coefficient related to age is not significant at any conventional significance level). For social skills, we do not interpret our findings by *EAV*s, because the association between life satisfaction and social skills is not stable as they are not significantly different from zero in the IV estimations, which are our preferred specifications. The results for verbal skills, in contrast, are the most robust findings.

Table 5. Equivalent age variations (*EAV*) for the association between mothers' life satisfaction and verbal skills of children aged two to three years

	EAV for the change of LS by 1 point	EAV for the change of LS by 1 s.d.
LS_2	1.363	2.212
$LS_{\overline{02}}$	2.725	3.628
LS_2 (IV)	3.899	6.329
$LS_{\overline{02}}$ (IV)	6.403	8.526

Note: The *EAV* gives the number of months of age that are predicted to increase the child's skills to the same extent as one point (or one standard deviation) in maternal life satisfaction according to the estimates in Table 4. The *EAV* is calculated as follows: $EAV = ME_{LS}/ME_{age}$, where ME_{LS} is the marginal effect of mother's life satisfaction on a child's verbal skills (given by the coefficients in Table 4, column 1) and ME_{age} is the marginal effect of one month of age of a child (at mean age), ME_{age} is 0.090, 0.069, 0.099, and 0.062 in the estimations with LS_2, $LS_{\overline{02}}$, LS_2 (IV), and $LS_{\overline{02}}$ (IV), respectively. S.d. is the standard deviation of the life satisfaction score. The standard deviation of LS_2 is 1.623, the s.d. of $LS_{\overline{02}}$ is 1.332. Authors' calculations with data from the SOEP (2001-2008).

Some studies on early attachment behavior of children reported gender differences suggesting that boys are more vulnerable than girls. Collin (1996) argues that this pattern is of indubitable importance and that it agrees with the general body of child development research. We check the importance of gender differences in our context of mothers' life satisfaction by estimating the VAB scores separately for boys and girls. The results presented in Table 6 reveal a noticeable difference between the two groups. For boys, the coefficients for the association between mothers' life satisfaction and their children's verbal, motor, and social skills are large and highly significant, while for girls the coefficients are mostly not significant or only on the 10%

level. This means that boys not only have lower VAB scores (which has been shown by the negative coefficient of the covariate "male" in Table 3) but are also more sensitive to their mothers' well-being.

Table 6. Estimation of the VAB scores, by gender

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Boys						
LS_2	0.159**	0.049	0.090+	0.102+	0.400*	371
	(0.057)	(0.073)	(0.052)	(0.056)	(0.163)	
$LS_{\overline{02}}$	0.249**	0.026	0.148*	0.205**	0.629**	345
	(0.073)	(0.098)	(0.069)	(0.077)	(0.237)	
LS_2 (IV)	0.552**	0.127	0.237+	0.279+	1.195*	292
	(0.186)	(0.180)	(0.135)	(0.164)	(0.468)	
$LS_{\overline{02}}$ (IV)	0.555**	0.073	0.217	0.310+	1.155*	283
	(0.191)	(0.184)	(0.135)	(0.168)	(0.480)	
Girls						
LS_2	0.062	0.071	0.116+	0.015	0.263+	393
	(0.044)	(0.081)	(0.061)	(0.043)	(0.156)	
$LS_{\overline{02}}$	0.104+	-0.006	0.125	0.023	0.246	371
	(0.060)	(0.098)	(0.081)	(0.057)	(0.217)	
LS_2 (IV)	0.096	-0.316	0.219	-0.122	-0.122	312
	(0.141)	(0.199)	(0.178)	(0.128)	(0.462)	
$LS_{\overline{02}}$ (IV)	0.073	-0.368+	0.235	-0.181	-0.240	309
	(0.158)	(0.221)	(0.198)	(0.140)	(0.511)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 3. ** $p<0.01$, * $p<0.05$, + $p<0.10$. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (2001-2008).

5.2 Robustness tests for the estimation of the VAB

As already mentioned, it is difficult to distinguish between a causal effect of mothers' life satisfaction on their children's development and endogeneity effects through unobserved heterogeneity. There could be outside factors that influence both mothers' life satisfaction and their children's VAB simultaneously and thus bias the estimated effect. We test two factors that could enhance such bias: mothers' personality and mothers' cognitive ability.

Empirical studies have shown that personality is an important predictor of subjective well-being (Diener and Lucas, 1999). If mothers with certain personality traits systematically report higher life satisfaction scores

and also have children with better developmental outcomes (no matter whether the children actually are better or the mothers only evaluate them as better), our estimates are biased. Nigg and Hinshaw (1998) found a significant association between mothers' personality traits and children's non-cognitive skill outcomes. In order to test the robustness of our models with respect to this issue, we introduce mothers' personality traits as an additional set of covariates. We use the Big Five personality traits, a concept in personality psychology according to which a personality can be fully described by the five dimensions of openness, conscientiousness, extraversion, neuroticism, and agreeableness.[15] The results of the estimations including the Big Five personality traits are shown in Table 7. The least squares estimates still suggest a strong positive correlation between mothers' life satisfaction (LS_2 and $LS_{\overline{02}}$) and children's verbal and motor skills. In the IV results, only the coefficient from the estimation of verbal skills remains robust. As argued above, this is likely to be due to the lower efficiency of IV estimations compared to least squares estimations. The even larger point estimate from the IV models suggests that reverse causality is not a problem but that measurement error might cause an attenuation bias in the OLS estimates. Overall, the effects of mothers' life satisfaction on children's verbal and motor skills decrease slightly but are still positive and significant when mothers' personality is controlled for. This suggests that personality is not a major confounding factor when estimating the relationship between mother's life satisfaction and verbal and social skills of two- to three-year-old children. The effects on social skills are less robust to this sensitivity test.

[15] For the concept of the Big Five in personality psychology, see McCrae and Costa (1996, 1999) and John and Srivastava (1999). For more information on the specific implementation of the Big Five traits in the SOEP survey, see Dehne and Schupp (2007). Descriptive statistics of the Big Five personality traits for our sample are given in Table B3 in Appendix B.

Table 7. Estimation of the VAB scores controlling for mothers' personality

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Openness	0.037*	0.040+	0.038*	0.042*	0.157**	
	(0.017)	(0.024)	(0.017)	(0.017)	(0.051)	
Conscientiousness	0.022	0.021	0.055*	0.040+	0.139*	
	(0.023)	(0.032)	(0.025)	(0.024)	(0.070)	
Extraversion	0.000	-0.002	-0.001	-0.001	-0.003	
	(0.017)	(0.025)	(0.019)	(0.018)	(0.057)	
Neuroticism	0.015	-0.005	-0.001	0.002	0.011	
	(0.016)	(0.023)	(0.017)	(0.018)	(0.055)	
Agreeableness	-0.002	0.049	-0.024	-0.018	0.005	
	(0.025)	(0.031)	(0.023)	(0.025)	(0.074)	
LS_2	0.104**	0.020	0.089*	0.041	0.253*	697
	(0.038)	(0.060)	(0.044)	(0.041)	(0.128)	
$LS_{\overline{02}}$	0.135**	-0.062	0.100+	0.066	0.239	677
	(0.049)	(0.072)	(0.055)	(0.052)	(0.165)	
LS_2 (IV)	0.377*	-0.170	0.141	0.049	0.397	591
	(0.147)	(0.156)	(0.115)	(0.131)	(0.390)	
$LS_{\overline{02}}$ (IV)	0.382*	-0.232	0.142	0.043	0.335	581
	(0.160)	(0.165)	(0.123)	(0.140)	(0.423)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 3 as well as the five personality traits given in this table. The coefficients of the personality traits given in this table are from the estimations with LS_2. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (see 2001-2008).

Another source of heterogeneity could be mothers' cognitive ability. Previous studies have shown that mothers' ability is related to child outcomes (through genetic endowments or educational quality).[16] If mothers with higher cognitive skills are also more satisfied with their lives, our results are biased. To test this possible influence we introduce two test scores of mothers' cognitive ability in our models, one for crystallized intelligence and one for fluid intelligence.[17] Since the tests have been carried out for only a small percentage of SOEP respondents, our sample is reduced from 764 to only 161 observations. The results of the estimations with the cognitive ability test scores are shown in Table 8. The point estimates do not decrease systematically compared to those in Table 4. The coefficients related to $LS_{\overline{02}}$ in the OLS estimations of verbal and motor skills become even larger. The IV estimates from the estimations of verbal

16 Cunha and Heckman (2008) find that mothers' cognitive skills positively affect children's cognitive skills but not children's non-cognitive skills, using US panel data. Anger and Heineck (2009), using SEOP data, find evidence of an intergenerational transmission of cognitive skills.

17 See Schupp et al. (2008) for a detailed description of the two ability tests. Descriptive statistics of the test scores for our sample are displayed in Table B3 in Appendix B.

skills also increase while those from the estimations of motor skills become insignificant. Again, the results for verbal skills appear to be most robust. Since the estimations in Table 8 are very inefficient due to the small sample size, one should be careful in interpreting the magnitude of these results. Nevertheless, from the general trend in these results we can conclude that mothers' cognitive ability does not appear to be a serious source of bias in estimating the association between mothers' subjective well-being and children's developmental functioning at age two to three.

As mentioned above, we cannot ultimately claim to identify causal effects. However, we have shown that two potentially important sources of heterogeneity—mothers' personality and mothers' cognitive ability—are not driving our results. The association between mothers' overall life satisfaction and children's verbal and motor skills remains remarkable.

Table 8. Estimation of the VAB scores controlling for mothers' cognitive ability

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Crystallized intelligence score	0.011	0.003	-0.018	-0.008	-0.012	
	(0.009)	(0.020)	(0.011)	(0.012)	(0.039)	
Fluid intelligence score	-0.002	-0.041+	-0.011	0.008	-0.046	
	(0.011)	(0.021)	(0.011)	(0.013)	(0.039)	
LS_2	0.085	0.168	0.162*	0.073	0.488*	161
	(0.104)	(0.119)	(0.064)	(0.078)	(0.229)	
$LS_{\overline{02}}$	0.285*	0.268	0.203*	0.203+	0.960**	145
	(0.132)	(0.173)	(0.079)	(0.113)	(0.318)	
LS_2 (IV)	0.446*	0.790*	0.138	0.027	1.400**	116
	(0.183)	(0.310)	(0.215)	(0.177)	(0.522)	
$LS_{\overline{02}}$ (IV)	0.565*	0.947*	0.158	0.036	1.705*	115
	(0.220)	(0.387)	(0.273)	(0.220)	(0.691)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 3 as well as the cognitive ability scores given in this table. The effects of the cognitive ability scores given in this table are from the estimations with LS_2. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (2001-2008).

5.3 Underlying mechanisms

In Section 2 we discussed several mechanisms by which mothers' subjective well-being could have an impact on children's skill formation. One mechanism could be that more satisfied mothers spend more time undertaking skill-enhancing activities with their children. This is what we test in the following. In SOEP questionnaire Q2, mothers were asked how often they were involved in certain activities with their children within the previous two weeks. We use this information to construct three variables: *activities outdoors*,

activities indoors, and *social activities*. The variables contain higher values the more frequently a mother is involved in such activities with her child. Appendix C provides the relevant part of the questionnaire and details on how the variables are constructed.

In the following we present estimates of the above model (as in Table 4), this time including the three activity variables. The results are presented in Table 9. The coefficients of the activity variables show the expected positive signs, especially for the expected domains (e.g., social activities is positively related to social skills). This suggests that the variables are constructed in a sensible way and are meaningful in predicting children's early development. Nevertheless, the estimated coefficients related to life satisfaction are still very similar to the results given in Table 4. This suggests that the association between mothers' life satisfaction and children's skill attainment is not (or only to a very limited extent) mediated by the time spent in the activities under examination here. The underlying mechanism that explains the rest of the association is not observed here. It might be related to the quality of the mother-child interaction, or, even more specifically, the quality of their attachment, which is influenced by the quality of the mother-child interaction. However this latter hypothesis cannot be explicitly tested by our data.

Table 9. Estimation of the VAB scores controlling for activities with the child

	Verbal skills	Activities of daily living	Motor skills	Social skills	Total VAB score	N
Activities outdoors	0.015	0.163*	-0.017	-0.040	0.121	
	(0.045)	(0.070)	(0.051)	(0.049)	(0.151)	
Activities indoors	0.133**	0.022	0.091**	0.067*	0.313**	
	(0.027)	(0.040)	(0.029)	(0.028)	(0.094)	
Social activities	0.062	0.083	0.032	0.122*	0.299+	
	(0.048)	(0.079)	(0.058)	(0.050)	(0.163)	
LS_2	0.104**	0.036	0.104*	0.066+	0.310**	744
	(0.039)	(0.055)	(0.040)	(0.037)	(0.118)	
LS_{02}	0.152**	-0.004	0.141**	0.118*	0.407*	699
	(0.049)	(0.071)	(0.054)	(0.051)	(0.170)	
LS_2 (IV)	0.362**	-0.115	0.263*	0.130	0.640+	590
	(0.122)	(0.143)	(0.116)	(0.112)	(0.349)	
LS_{02} (IV)	0.354**	-0.136	0.254*	0.118	0.590	579
	(0.129)	(0.151)	(0.121)	(0.118)	(0.368)	

Note: Each cell gives the result from a separate least squares estimation of the VAB score indicated in the column on the life satisfaction variable indicated in the row. All models include the set of control variables listed in Table 3 as well as the activity variables given in this table. The effects of the activity variables given in this table are from the estimations with LS_2. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (see 2001-2008).

5.4 Maternal life satisfaction and the socio-emotional behavior of five- to six-year-old children

In this section we analyze the association between mothers' life satisfaction and the socio-emotional behavior (SEB) of five- to six-year-old children. Table 10 gives the results for the least squares estimations of the Total Difficulties Score (column 1) and the Prosocial Behavior Score (column 3) as well as of a probit estimation of the probability of a child being "normal" compared to being "borderline" or "abnormal" according to the SEB classification (see Section 3.1). Despite the small sample size of only 159 observations, we find significant results suggesting that more satisfied mothers have children with lower Total Difficulties Scores and with a higher probability to be "normal". The results suggest that increasing maternal life satisfaction by one point (on the 11-point scale) would raise the probability of a child being normal by 6.8 percentage points. Increasing mothers' life satisfaction by one standard deviation (s.d. = 1.5954) would increase the probability by 10.8 percentage points.

Table 10. Estimation of the SEB of children aged five to six years

	(1) Total Difficulties Score (OLS)	(2) "Normal" behavior (Probit: marg. eff.)	(3) Prosocial Behavior Score (OLS)
Characteristics of the mother/household:			
LS_5	-0.846*	0.068*	0.163+
	(0.340)	(0.028)	(0.087)
Age of mother	0.124	-0.079	0.312
	(0.964)	(0.086)	(0.261)
(Age of mother)^2	-0.003	0.001	-0.004
	(0.013)	(0.001)	(0.004)
Education (Ref is vocational degree):			
University degree	-0.120	-0.132	0.312
	-1.180	(0.136)	(0.326)
No professional degree	1.738	0.029	-0.068
	-1.759	(0.132)	(0.422)
Education of partner (Ref is vocational degree):			
Partner university degree	0.632	-0.095	-0.666*
	-1.117	(0.125)	(0.316)
Partner no professional degree	1.083	-0.025	-0.625
	-1.518	(0.141)	(0.459)
No partner	5.070**	-0.431**	-0.885+
	-1.763	(0.156)	(0.462)
Employment status (Ref is not employed):			
Part-time employed	-0.336	0.043	-0.588*
	-1.110	(0.096)	(0.281)
Full-time employed	1.005	0.054	-0.477
	-1.480	(0.122)	(0.382)
Household income (in logs)	2.720+	-0.253+	-0.196
	-1.379	(0.135)	(0.378)
Other language	1.428	-0.057	-0.379
	-1.284	(0.112)	(0.343)
Characteristics of the child:			
Age of child	1.159	-0.209	-0.160
	-3.232	(0.283)	-1.107
(Age of child)^2	-0.010	0.002	0.001
	(0.023)	(0.002)	(0.008)
Child is male	1.758*	-0.201**	-0.441+
	(0.877)	(0.076)	(0.235)
Disease / dysfunction	2.280*	-0.158+	0.106
	-1.105	(0.081)	(0.328)
In formal child care: hrs per week	-0.025	0.002	0.014
	(0.032)	(0.003)	(0.009)
Constant	-42.763		7.634
	-114.072		-38.592
N	159	159	159
Adjusted/pseudo R^2	0.134	0.168	0.042

Note: Results in column 1 and 3 from least squares estimations, results in column 2 from a probit estimation. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (2001-2008).

Analogously to Section 5.1, we estimate different specifications of the model using lagged life satisfaction (LS_4), life satisfaction in the child's first year (LS_0), and mean life satisfaction ($LS_{\overline{05}}$). The results are summarized in Table 11. Lagged life satisfaction is a significant predictor for the Total Difficulties Score of a child and for the probability of a child being normal. Mothers' life satisfaction when the child is a newborn (LS_0) is a significant predictor only in the least squares model. Mean life satisfaction (here: $LS_{\overline{05}}$) is again the best predictor, having a highly significant effect for both the Total Difficulties Score and the binary estimation of being "normal". This again suggests that the baseline level of maternal life satisfaction rather than maternal life satisfaction in a specific period is important for the development of the non-cognitive skills analyzed here.

In the last two rows of Table 11, we show the results of the IV estimations using mother's life satisfaction before pregnancy as an instrument to eliminate a potential reverse causality problem and attenuation bias due to measurement error. In this estimation the standard errors increase to a level where the marginal effects are no longer significant. This is likely to be due to the efficiency loss implied by IV estimations and to the very small sample size, which for the IV estimations even had to be reduced to 125 and 120 observations for the models with LS_5 and $LS_{\overline{05}}$, respectively.[18] Although not significant, the point estimates of the life satisfaction effect do not decrease compared to the least squares and probit estimates, and we should therefore not conclude that reverse causality plays a substantial role here. In any case the OLS and probit results have to be interpreted with caution.

In column 3 of Tables 10 and 11 the Prosocial Behavior Score of five- to six-year-old children is estimated. The results in Tables 10 suggest that more satisfied mothers have more prosocial children. However, Table 11 reveals that only in few specifications are the estimates significantly different from zero. The association does not appear to be robust.

Estimating the above models separately for boys and girls (as done for the VAB scores) is problematic because the statistical reliability of the results is questionable due to the very small sample size. When estimating separate samples anyway, we observe a similar pattern to the one above where boys' outcomes are much more clearly associated with maternal life satisfaction than girls' outcomes. However, because of the very small sample size, one should be cautious in making interpretations based on these results.[19]

[18] The reduction of the sample size is due to the fact that some women have not yet been observed in t=-2, i.e., seven years before the collection of the SEB in t = 5.

[19] The estimation results by gender are available from the authors upon request.

Table 11. Estimation of children's SEB, different specification of mothers' life satisfaction

	(1) Total Difficulties Score (OLS)	(2) "Normal" behavior (Probit: marg. eff.)	(3) Prosocial Behavior Score (OLS)	N
LS_5	-0.846*	0.068*	0.163+	159
	(0.340)	(0.028)	(0.087)	
LS_4	-0.593*	0.063**	0.121	156
	(0.296)	(0.024)	(0.079)	
LS_0	-0.851*	0.037	0.172*	158
	(0.349)	(0.025)	(0.083)	
$LS_{\overline{05}}$	-1.305**	0.108**	0.161	150
	(0.413)	(0.036)	(0.103)	
LS_5 (IV)	-1.899	0.125	-0.030	125
	(1.229)	(0.088)	(0.283)	
$LS_{\overline{05}}$ (IV)	-1.056	0.076	-0.033	120
	(0.842)	(0.072)	(0.187)	

Note: Each cell gives the result from a separate estimation of the outcome variable indicated in the column on the life satisfaction variable indicated in the row. Results in column 1 and 3 from least squares estimations, results in column 2 from probit estimations. All models include the set of controls listed in Table 10. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (2001-2008).

5.5 Robustness tests for the estimation of the SEB

Analogously to the analysis of the adaptive behavior, we check our results with respect to maternal personality traits because one could argue that personality might influence both mothers' life satisfaction and children's socio-emotional behavior, which would lead to a bias in our results. We therefore again include the five personality traits in our models and show the results in Table 12. The estimated marginal effects of maternal life satisfaction on the outcomes slightly decrease in absolute values. Raising a mother's contemporaneous life satisfaction by one point would increase the probability of her child being "normal" by 5.6 percentage points (compared to 6.8 percentage points in the results without personality traits, see Table 11). For $LS_{\overline{05}}$, the increase in probability falls from 10.8 to 6.4 percentage points (column 2 in Table 12 compared to Table 11). The results from the least squares regressions of the Total Difficulties Score are also slightly attenuated (column 1 in Table 12). As above, the standard errors produced by IV estimations are too high for the effects to be statistically significant although the point estimates have not decreased. Here again, the coefficients have to be interpreted with caution because we cannot rule out that reverse causality drives the results.

Table 12. Estimation of children's SEB controlling for mothers' personality

	(1) Total Difficulties Score (OLS)	(2) "Normal" behavior (Probit: marg. eff.)	(3) Prosocial Behavior Score (OLS)	N
Openness	-0.132	0.005	-0.004	
	(0.148)	(0.012)	(0.035)	
Conscientiousness	-0.244	0.028+	0.053	
	(0.195)	(0.016)	(0.058)	
Extraversion	-0.096	0.011	-0.022	
	(0.171)	(0.013)	(0.043)	
Neuroticism	0.152	-0.014	0.006	
	(0.140)	(0.012)	(0.035)	
Agreeableness	-0.213	0.011	0.186**	
	(0.184)	(0.016)	(0.049)	
LS_5	-0.616+	0.056*	0.154+	156
	(0.360)	(0.029)	(0.088)	
$LS_{\overline{05}}$	-0.832+	0.064+	0.105	148-157
	(0.446)	(0.037)	(0.115)	
LS_5 (IV)	-1.492	0.108	-0.093	123
	(1.225)	(0.090)	(0.275)	
$LS_{\overline{05}}$ (IV)	-0.837	0.072	-0.131	118
	(0.905)	(0.071)	(0.208)	

Note: Each cell gives the result from a separate estimation of the outcome variable indicated in the column on the life satisfaction variable indicated in the row. Results in column 1 and 3 from least squares estimations, results in column 2 from probit estimations. All models include the set of controls listed in Table 10 as well as the five personality traits given in this table. The effects of the personality traits given in this table are from the estimations with LS_5. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (see 2001-2008).

Although we have shown that the association between maternal life satisfaction and children's socio-emotional behavior is not mainly driven by the mother's personality, we cannot rule out that other sources of endogeneity play a role. One other source could be mothers' cognitive ability, which we have tested in the context of the adaptive behavior of two- to three-year-old children. Unfortunately, we are not able to test this in the context of the socio-emotional behavior of five- to six-year-old children because the sample would be reduced to a size that can no longer be estimated because the cognition data is available only for a limited subsample of respondents.

5.6 Underlying mechanisms

In the following, we analyze the mechanism through which mothers' life satisfaction is associated with children's SEB. Analogously to Section 5.3, we introduce the frequency of activities a mother undertakes

with her child, using the variables "activities outdoors," "activities indoors," and "social activities."[20] In Table 13 we present the results of the estimations with the activity variables. The association between mothers' life satisfaction and children's SEB is very similar to the findings in Table 11. One of the effects estimated by IV is even significantly different from zero in this specification. This means that the frequency of activities a mother undertakes with her child is not the (only) channel through which mothers' life satisfaction affects children's SEB. The true channel is not explicitly observed in this study and could (as above) be speculated to be the quality of the mother-child interaction or the quality of the attachment.

Table 13. Estimation of children's SEB controlling for activities with the child

	(1) Total Difficulties Score (OLS)	(2) "Normal" behavior (Probit: marg. eff.)	(3) Prosocial Behavior Score (OLS)	N
Activities outdoors	-0.077	0.029	-0.004	
	(0.363)	(0.031)	(0.101)	
Activities indoors	-0.125	-0.008	0.169**	
	(0.181)	(0.017)	(0.054)	
Social activities	0.717	-0.077*	-0.009	
	(0.438)	(0.039)	(0.120)	
LS_5	-0.767*	0.050	0.123	127
	(0.375)	(0.031)	(0.100)	
$LS_{\overline{05}}$	-1.444**	0.099*	0.183	121
	(0.469)	(0.045)	(0.122)	
LS_5 (IV)	-2.125+	0.065	0.130	102
	(1.210)	(0.089)	(0.264)	
$LS_{\overline{05}}$ (IV)	-1.194	0.014	0.080	98
	(0.861)	(0.075)	(0.186)	

Note: Each cell gives the result from a separate estimation of the outcome variable indicated in the column on the life satisfaction variable indicated in the row. Results in column 1 and 3 from least squares estimations, results in column 2 from probit estimations. All models include the set of controls listed in Table 10 as well as the activity variables given in this table. The effects of the activity variables given in this table are from the estimations with LS_5. ** p<0.01, * p<0.05, + p<0.10. Robust standard errors in parentheses. Authors' calculations with data from the SOEP (see 2001-2008).

6 Conclusions

Previous research has shown the importance of early childhood for the overall development of human skills. Economic studies have found that factors like parental employment, household income, and formal child-care affect children's development, and psychologists have revealed that maternal depression can have deleterious effects on early childhood outcomes. We contribute to this body of literature by analyzing the relationship between mothers' overall life satisfaction and the early childhood outcomes of their children. To

[20] Appendix C provides the full text of the relevant part of SOEP questionnaire Q3.

our knowledge this is the first study to investigate the relationship between mothers' overall life satisfaction and early childhood outcomes.

Our results, based on data from the German Socio-Economics Panel Study, indicate that the more satisfied a mother, the better the verbal and motor skills of her two- to three-year-old child and the more "normal" the socio-emotional behavior of her five- to six-year-old child. The relationship is more pronounced for boys than for girls. Using mothers' life satisfaction before the birth of her child as an instrument, we can exclude the problem of reverse causality. Addressing the issue of further individual heterogeneity, robustness tests indicate that neither mothers' personalities nor their cognitive abilities are the main drivers of the results. Still, we cannot ultimately claim to identify causal effects because unobserved heterogeneity could not be completely excluded. Nevertheless, the effect of mothers' subjective well-being on child outcomes is amazingly high compared to other factors like parental education, employment, and hours in child care. One underlying mechanism by which maternal life satisfaction and child outcomes are related might be the quality of the attachment (referring to the attachment theory in developmental psychology). If more satisfied mothers are more sensitive and responsive to their children, this boosts the quality of attachment between a young child and her mother and allows the child to develop better. Another mechanism might be more general the quality of mother/child interaction during activities the mother engages in with her child.

From a policy point of view, our findings have important consequences for the debate about family policies. Some conservative voices postulate that mothers nowadays are egoistic thinking more about their careers than about their children. If, however, their career plays an important role in their life satisfaction and a mother's life satisfaction affects her child's outcomes, this claim becomes pointless. After all, policies that improve the subjective well-being of mothers may in turn be beneficial for their children's development. Policies, for example, that help mothers combine family and employment are likely to improve their subjective well-being because they help them to have the freedom of choice whether entering employment or not.

Further, if the effect will be found to be causal, medical practitioners dealing with mothers or pregnant women should inform them about the crucial importance of their own well-being for the development of their child. To provide these women with full support, it should be ensured that workers in frontline social services go beyond simply asking general questions about the mother's well-being. Service providers should also work to increase the visibility and accessibility of support services, keeping in mind that mothers may find it hard to ask for help or admit that they need it (Gutmann et al., 2009).

Appendix A

Below is the full text (English translation) of the relevant parts of SOEP questionnaires Q2 and Q3 that were used to create the measures of the Vineland Adaptive Behavior (VAB) for two- to three-year-old children and the measures of Socio-Emotional Behavior (SEB) for five- to six-year-old children.

Vineland Adaptive Behavior (VAB) of children aged two to three years (SOEP questionnaire Q2):
For parents, it is always a big event when their child learns something new. Please tell us what those new things are in the case of your child. (Rate child's ability to perform each task as either "yes", "to some extent", or "no")

Talking:
V.1. Understands brief instructions such as "go get your shoes".
V.2. Forms sentences with at least two words.
V.3. Speaks in full sentences (with four or more words).
V.4. Listens attentively to a story for five minutes or longer.
V.5. Passes on simple messages such as "dinner is ready".

Activities of daily living:
ADL.1. Uses a spoon to eat, without assistance and without dripping.
ADL.2. Blows his/her nose without assistance.
ADL.3. Uses the toilet to do "number two".
ADL.4. Puts on pants and underpants the right way around.
ADL.5. Brushes his/her teeth without assistance.

Movement:
M.1. Walks forwards down the stairs.
M.2. Opens doors with the door handle.
M.3. Climbs up playground climbing equipment and other high playground structures.
M.4. Cuts paper with scissors.
M.5. Paints/draws recognizable shapes on paper.

Social relationships:
S.1. Calls familiar people by name; for example, says "mommy" and "daddy" or uses the father's first name.
S.2. Participates in games with other children.
S.3. Gets involved in role-playing games (''playing pretend'').
S.4. Shows a special liking for particular playmates or friends.
S.5. Calls his/her own feelings by name, e.g., "sad", "happy", "scared."

The answers to each item are coded to 2 (“yes”), 1 (“to some extent”), and 0 (“no”). The answers are summed up to construct the four domain-specific scores verbal skills, activities of daily living, motor skills, and social skills, which hence can each take on values between 0 and 10. The four domain-specific scores are further summed up to obtain the total VAB score, which might take on values between 0 and 40.

Socio-Emotional Behavior (SEB) of children aged five to six years (SOEP questionnaire Q3):
To what extent do or don’t each of the following statements apply to your child? For each answer, think about your child’s behavior in the last six months. (Answer “not at all“, ”somewhat true“, or ”completely true“)

My child...

1. is thoughtful.
2. is restless, hyperactive, can’t sit still long.
3. likes to share with other children (sweets, toys, crayons, etc.).
4. often has tantrums, is quick-tempered.
5. is a loner, usually plays alone.
6. is helpful when others are hurt, sick, or sad.
7. is always fidgety.
8. often fights with or picks on other children.
9. is often unhappy or downcast, cries a lot.
10. is generally well-liked by other children.
11. is easily distracted, unfocused.
12. is nervous or clinging in new situations, easily loses self-confidence.
13. is often teased or picked on by others.
14. often helps others of his/her own accord (parents, teachers, children).
15. gets along better with adults than with children.
16. has many fears, gets scared easily.
17. finishes what he/she starts, can concentrate for a long time.

The answers to each item are coded as 0 (“not at all”), 1 (“somewhat true”) and 2 (“completely true”). Thirteen of these items form the four dimensions: emotional symptoms (items: 9, 12, 16), conduct problems (items: 4, 8), hyperactivity/inattention (items: 2, 7, 11, 17), and peer relationship problems (items: 5, 10, 13, 15). The four dimensions are equally weighted to construct the Total Difficulties Score, which ultimately takes on values between 0 and 40.

The four items 1, 3, 6, and 14 are used to construct the Prosocial Behavior Score; the score is coded to take on values between 0 and 10.

Appendix B

Table B1. Control variables for the period t = 2

	Mean	s.d.
Characteristics of the mother:		
Age (in years)	33.40	5.69
Education:		
University degree	0.237	
Vocational degree	0.596	
No professional degree	0.168	
Education of the partner:		
University degree	0.264	
Vocational degree	0.521	
No professional degree	0.105	
No partner in HH	0.110	
Employment:		
Not employed	0.531	
Part-time	0.329	
Full-time	0.140	
Net HH income (Euros per month)	3042	1737
Other language	0.191	
Characteristics of the child:		
Age (in months)	33.25	3.97
Male	0.486	
Disease / dysfunction	0.461	
Formal child care (hrs per week)	10.68	14.32

Note: Data from the SOEP (2001-2008), authors' calculations, N = 764.

Table B2. Control variables for period t = 5

	Mean	s.d.
Characteristics of the mother:		
Age (in years)	36.43	5.25
Education:		
University degree	0.220	
Vocational degree	0.679	
No professional degree	0.101	
Education of the partner:		
University degree	0.239	
Vocational degree	0.522	
No professional degree	0.088	
No partner in HH	0.151	
Employment:		
Not employed	0.296	
Part-time	0.547	
Full-time	0.157	
Net HH income (Euros per month)	3347	1641
Other language	0.182	
Characteristics of the child:		
Age (in months)	69.42	3.93
Male	0.516	
Disease / dysfunction	0.774	
Formal child care (hrs per week)	21.79	13.73

Note: Data from the SOEP (2001-2008), authors' calculations, N = 159.

Table B3. Descriptive statistics of the Big Five personality traits[a] and two cognitive ability test scores[b] for the samples t=2 and t=5

	t=2				
	Mean	s.d.	N	Min	Max
Openness	13.7661	3.627599	701	3	21
Conscientiousness	17.66	2.750744	703	4	21
Extraversion	15.0242	3.33498	702	5	21
Neuroticism	12.5213	3.582334	704	3	21
Agreeableness	16.701	2.759331	699	8	21
Crystallized intelligence score	27.8447	10.93135	161	1	55
Fluid intelligence score	30.3415	9.310881	164	10	52
	t=5				
	Mean	s.d.	N	Min	Max
Openness	13.9427	3.505018	157	4	21
Conscientiousness	18.1013	2.498891	158	8	21
Extraversion	15.3885	3.175729	157	6	21
Neuroticism	12.3019	3.650481	159	3	21
Agreeableness	16.7898	2.552103	157	10	21
Crystallized intelligence score	26.375	10.54931	24	5	43
Fluid intelligence score	30.5417	8.145306	24	16	43

Note: [a] The Big Five personality traits were incorporated in the SOEP questionnaire in 2005. We assume for our sample that the traits are stable over time.
[b] The crystallized and the fluid intelligence score are test scores from two mini IQ tests that have been carried out with part of the SOEP in 2006. For a detailed documentation of the tests, see Schupp et al. (2008). We assume for our sample that the test scores are stable over time.

Data from the SOEP (2001-2008), authors' calculations.

Appendix C

Below is the full text (English translation) of the relevant parts of SOEP questionnaires Q2 and Q3 that were used to create the variables measuring the frequency of joint activities.

How many times in the last 14 days have you or the main caregiver done the following activities together with your child? (Answers “daily“, “several times a week“, “at least once a week“, ”never“)

1. singing children's songs with or to the child

2. taking walks outdoors (only in Q2)
   outdoor activities (walks or similar activities) (only in Q3)

3. painting or doing arts and crafts

4. reading or telling stories (only in Q2)
   reading or telling stories in German (only in Q3)
   reading or telling stories in another language (only in Q3)

5. looking at picture books (only in Q2)

6. going to the playground

7. visiting other families with children

8. going shopping with the child

9. playing card games or games of dice (only in Q3)

10. visit a children’s theater, circus, museum, exhibition, or the like (only in Q3)

The answers to the items are coded as 3 (“daily”), 2 (“several times a week”), 1(“at least once a week”), and 0 (“never”). Items 2 (2a for t=2 and 2b for t=5) and 6 are summed up to obtain the variable “activities outdoors”, items 1, 3, 4 (4a for t=2 and 4b+4c for t=5), 5 (only for t=2), and 9 (only for t=5) are summed up to obtain the variable “activities indoors” and items 7, 8, and 10 (only for t=5) are summed up to obtain the variable “social activities”. Descriptive statistics of the variables for the periods t = 2 and t = 5 are presented in Table C1.

Table C1. Descriptive statistics of the activity variables

	t=2				
	Mean	s.d.	N	Min	Max
Activities outdoors	4.11111	1.286026	756	0	6
Activities indoors	9.19231	2.352449	754	0	12
Social activities	2.8329	1.132685	760	0	6
	t=5				
	Mean	s.d.	N	Min	Max
Activities outdoors	3.75796	1.312666	157	0	6
Activities indoors	7.80741	2.569907	135	1	15
Social activities	2.98676	1.076951	151	1	6

Note: Data from the SOEP (2001-2008), authors' calculations.

References

Adam, E. K., Gunnar, M. R., & Tanaka, A. (2004). Adult attachment, parent emotion, and observed parenting behavior: mediator and moderator models. *Child Development*, 75, 110-22.

Anger, S. & Heineck, G. (2009). Do smart parents raise smart children? The intergenerational transmission of cognitive abilities. SOEPpapers 156. DIW Berlin.

Baum II, C. L. (2003). Does early maternal employment harm child development? An analysis of the potential benefits of leave taking. *Journal of Labor Economics*, 21, 409-448.

Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 55, 83-96.

Belsky, J. (1997). Classical and contextual determinants of attachment security. In W. Koops, J. B. Joeksma, & C. C. van den Boom (Eds.), *Development of interaction and attachment: Traditional and non-traditional approaches* (pp. 39-58). Amsterdam, Oxford, New York. u.a.: North Holland.

Bowlby, J. (1969). Attachment and loss. Vol. 1: *Attachment*. London: Hogarth Press and Institute of Psycho-Analysis.

Bradley, R. H., & Caldwell, B. M. (1980): The relation of the home environment, cognitive competence, and IQ among males and females. *Child Development*, 51, 1140-1148.

Bradley, R. H., & Caldwell, B. M. (1984). The Relation of infants' home environment to achievement test performance in first grade: A follow-up study. *Child Development*, 55, 803-809.

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic status and child development. *Annual Review of Psychology*, 53, 371–399.

Caneiro, P., & Heckman, J. J. (2003). Human Capital Policy. NBER Working Paper No. 9495.

Cawley, J., & Spiess, C. K. (2008). Obesity and skill attainment in early childhood. *Economics and Human Biology*, 6, 388-397.

Cicchetti, D., Ackerman, B. P., & Izard, C. E. (1995). Emotions and emotion regulation in developmental psychopathology. *Development and Psychopathology*, 7, 1-10.

Clark, A. (2006): A note on unhappiness and unemployment duration. *Applied Economics Quarterly*, 52, 291-308.

Collin, V. L. (1996). *Human attachment*. Philadelphia: Temple University Press.

Coneus, K., & Pfeiffer, F. (2007). Self-productivity in early childhood. ZEW Discussion Paper Number 07-053, Mannheim.

Coneus, K., & Sprietsma, M. (2009). Intergenerational transmission of human capital in early childhood. ZEW Discussion Paper Number 09-038, Mannheim.

Cunha, F., & Heckman, J. J. (2007). The technology of skill formation. *American Economic Review Papers and Proceedings*, 97, 31-47.

Cunha, F., & Heckman, J. J. (2008). Formulating, identifying and estimating the technology of cognitive and noncognitive skill formation. *Journal of Human Resources*, 43, 738-782.

Cunha, F., Heckman, J. J., Lochner, L., & Masterov, D. V. (2005). Interpreting the evidence on life cycle skill formation. NBER Working Paper 11331, Washington.

Dehne, M., & Schupp, J. (2007). Persönlichkeitsmerkmale im Sozio-oekonomischen Panel (SOEP) – Konzept, Umsetzung und empirische Eigenschaften. Research Notes 26. DIW Berlin.

Diener, E., & Lucas, R. E. (1999). Personality and subjective well-being. In D. Kahneman, E. Diener, & N. Schwarz (Eds.), *Well Being: The Foundations of Hedonic Psychology* (pp. 353–373). New York: Russel Sage Foundation.

Diener, E., Lucas, R. E., & Napa Scollon, C. (2006). Beyond the hedonic treadmill – revising the adaptation theory of well-being. *American Psychologist*, 61, 305-314.

Di Tella, R., & MacCulloch, R. (2006). Some uses of happiness data in economics. *Journal of Economic Perspectives*, 20, 25–46.

Dolan, P., Peasgood, T., & White, M. (2008). Do we really know what makes us happy? A review of the economic literature on the factors associated with subjective well-being. *Journal of Economic Psychology*, 29, 94–122.

Felfe, C. & Hsin, A. (2009): The Effect of Maternal Work Conditions on Child Development, Paper presented at the 3rd Leibniz Conference on Noncognitive Skills, October 23rd 2009 in Belin.

Frey, B. S., & Stutzer, A. (2002a). *Happiness and economics: How the economy and institutions affect human well-being*. Princeton: Princeton University Press.

Frey, B. S., & Stutzer, A. (2002b). What can economists learn from happiness research? *Journal of Economic Literature*, 40, 402–435.

Garces, E., Thomas, D., & Currie, J. (2002). Longer-term effects of head start. *American Economic Review*, 92, 999-1012.

Gloger-Tipelt, G., König, L., Zweyer, K., & Lahl, O. (2007). Bindung und Problemverhalten bei fünf und sechs Jahre alten Kindern. *Kindheit und Entwicklung*, 16, 209-219.

Goodman, R. (1997). The Strengths and Difficulties Questionnaire: A research note. *Journal of Child Psychology and Psychiatry*, 38, 581-586.

Greene, W. H. (2008). *Econometric analysis* (6th ed.). Upper Saddle River New Jersey: Pearson Prentice Hall.

Grossmann, K. E., & Grossmann, K. (1995). Frühkindliche Bindung und Entwicklung individueller Psychodynamik über den Lebenslauf. *Familiendynamik*, 20, 171-192.

Grossmann, K. E., & Grossmann, K. (1996). Kulturelle Perspektiven der Bindungsentwicklung in Japan und Deutschland. In G. Trommsdorff, & H.-J. Konrad (Eds.), *Gesellschaftliche und individuelle Entwicklung in Japan und Deutschland (*pp. 215-235.). Konstanz: Universitätsverlag.

Gutman, L., Brown, J., & Akerman, R. (2009). Nurturing parenting capability: the early years. Wider Benefits of Learning Research Report No. 30, London.

Heckman, J. J. (2007). The economics, technology, and neuroscience of human capability formation. *PNAS* 104. 13250-13255.

Heckman, J. J. (2008). Schools, skills, and synapses. IZA Discussion Paper No. 3515, Bonn.

Hill, J., Waldfogel, J., Brooks-Gunn, J. (2002). Differential effects of high-quality child care. *Journal of Policy Analysis and Management*, 21, 601-627.

James-Burdumy, S. (2005). The effect of maternal labor force participation on child development. *Journal of Labour Economics*, 23, 177-211.

John, O., & Srivastava, S. (1999). Big Five Trait Taxonomy. History, measurement, and theoretical perspectives. In L. Pervin, & O. John (Eds.), *Handbook of personality. theory and research* (pp. 102-139). New York: Guilford.

Korntheuer, P., I. Lissmann, & Lohaus, A. (2007). Bindungssicherheit und die Entwicklung von Sprache und Kognition. *Kindheit und Entwicklung*, 16, 180-189.

Layard, R. (2005). *Happiness: Lessons from a new science*. London: Penguin.

Lucas, R. E. (2007). Adaptation and the set-point model of subjective well-being – does happiness change after major life events? *Current Directions in Psychological Science*, 16, 75-79.

Lucas, R. E., & B. M. Donnellan (2007). How stable is happiness? Using the STARTS model to estimate the stability of life satisfaction. *Journal of Research in Personality*, 41, 1091-1098.

Magnuson, K. A., Ruhm, C. J., & Waldfogel, J. (2007). Does prekindergarten improve school preparation and performance? *Economics of Education Review*, 26, 33-51.

McCrae R. R., & Costa P. T., Jr. (1996). Toward a new generation of personality theories: Theoretical contexts for the five-factor model. In J. S. Wiggins (Ed.), *The five-factor model of personality: Theoretical perspectives* (pp. 51-87). New York: Guilford.

McCrae R. R., & Costa P. T., Jr. (1999). A five-factor theory of personality. In L. A. Pervin, & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 139-153). New York: Guilford.

Nigg, J. T., & Hinshaw, S. P. (1998). Parent personality traits and psychopathology associated with antisocial behaviours in childhood attention-deficit hyperactivity disorder. *Journal of Child Psychology and Psychiatry*, 39, 145-159.

Nummer-Winkler (2000): Rabenmütter? Zur Vereinbarkeit von Familie und Beruf , Max-Planck-Forschung 2000.

Reissland, N., Shepherd, J., & Herrera, E. (2003). The pitch of maternal voice: a comparison of mothers suffering from depressed mood and non-depressed mothers reading books to their infants. *Journal of Child Psychology and Psychiatry*, 44, 255-261.

Schmiade, N., Spieß, C. K., & Tietze, W. (2008). Zur Erhebung des adaptiven Verhaltens von zwei- und dreijährigen Kindern im Sozio-oekonomischen Panel (SOEP), *SOEP Paper* No. 116.

Schupp, J., Spiess, C. K., & Wagner, G. G. (2008). Die verhaltenswissenschaftliche Weiterentwicklung des Erhebungsprogramms des SOEP. *Vierteljahrshefte zur Wirtschaftsforschung*, 77, 63-76.

Schupp, J., Hermann, S., Jaensch, P., & Lang, F. R. (2008). Erfassung kognitiver Leistungspotentiale Erwachsener im Sozio-oekonomischen Panel (SOEP). Data Documentation 32, DIW Berlin.

Siedler, T., Schupp, J., Spieß, C. K., & Wagner, G. G. (2009). The German Socio-Economic Panel (SOEP) as reference data set. *Schmollers Jahrbuch* (European Data Watch Section), 129, 367-374.

Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). The Vineland Adaptive Behavior Scales. American Guidance Service, Circle Pines, MN.

Sroufe, L. A. (1990). An organizational perspective on the self. In D. Cicchetti, & M. Beeghly (Eds.), *The self in transition: Infancy to childhood* (pp. 281-307). Chicago: University of Chicago Press.

Stein, A., Malmberg, L.E., Sylva, K., Barnes, J., Leach, P., & the FCCC team (2008). The influence of maternal depression, caregiving, and socioeconomic status in the post-natal year on children`s language development. *Child: Care, Health and Development*, 34, 603-612.

Taylor, B. A., Dearing, E., & Mc Cartney, K. (2004). Incomes and outcomes in early childhood. *Journal of Human Resources*, 39, 980-1007.

Van Ijzendoorn, M. H., Dijkstra, J., & Bus, A. G. (1995). Attachment, intelligence and language: A meta analysis. *Social Development*, 4, 115-128.

Van Praag, B. M. S., & Ferrer-i-Carbonell, A. (2004). *Happiness quantified: A satisfaction calculus approach*. Oxford: Oxford University Press.

Wagner, G. G., Frick, J. R., & Schupp, J. (2007). The German Socio-Economic Panel Study (SOEP) – Scope, evolution, and enhancements. *Schmollers Jahrbuch*, 127, 139-169.

Wiegand-Grefe, S., Geers, P., Plaß, A., Petermann, F., & Riedesser, P. (2009). Kinder psychisch kranker Eltern: Zusammenhänge zwischen subjektiver elterlicher Beeinträchtigung und psychischer Auffälligkeit der Kinder aus Elternsicht. *Kindheit und Entwicklung*, 18, 111-121.

Wooldridge, J. M. (2009). *Introductory econometrics. A modern approach*. (4th ed.). Cincinnati, OH: South-Western College Publishing.

Zimmer, K. P., & Minkovitz, C. S. (2003). Maternal depression: an old problem that merits increased recognition by child healthcare practitioners. *Current Opinion in Pediatrics*, 15, 636-640.

Acknowledgements:

The authors thank the participants of the Second Conference on Non-cognitive Skills in Constance, Germany, and the participants of the meeting of the Council for the Economics of Education at the Verein für Socialpolitik, Landau for helpful comments and suggestions. C. Katharina Spiess appreciates the hospitality of the Center for Demography and Ecology at the University of Washington, Seattle, during her visit, which allowed her to work on parts of this project. Spiess also gratefully acknowledges travel funding from the German Science Foundation (Project No.SP 1091/1-1). Deborah A. Bowen provided helpful editorial assistance.