

Anand, Paul; Roope, Laurence

**Working Paper**

## The Development and Happiness of Very Young Children

IZA Discussion Papers, No. 10218

**Provided in Cooperation with:**

IZA – Institute of Labor Economics

*Suggested Citation:* Anand, Paul; Roope, Laurence (2016) : The Development and Happiness of Very Young Children, IZA Discussion Papers, No. 10218, Institute for the Study of Labor (IZA), Bonn

This Version is available at:

<https://hdl.handle.net/10419/147904>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*

IZA DP No. 10218

## The Development and Happiness of Very Young Children

Paul Anand  
Laurence Roope

September 2016

# The Development and Happiness of Very Young Children

**Paul Anand**

*The Open University, University of Oxford,  
London School of Economics, Columbia University and IZA*

**Laurence Roope**

*University of Oxford*

Discussion Paper No. 10218  
September 2016

IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
E-mail: [iza@iza.org](mailto:iza@iza.org)

Any opinions expressed here are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The Institute for the Study of Labor (IZA) in Bonn is a local and virtual international research center and a place of communication between science, politics and business. IZA is an independent nonprofit organization supported by Deutsche Post Foundation. The center is associated with the University of Bonn and offers a stimulating research environment through its international network, workshops and conferences, data service, project support, research visits and doctoral program. IZA engages in (i) original and internationally competitive research in all fields of labor economics, (ii) development of policy concepts, and (iii) dissemination of research results and concepts to the interested public.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

## ABSTRACT

### The Development and Happiness of Very Young Children\*

The paper demonstrates how Sen's (1985) alternative approach to welfare economics can be used to shed light on the wellbeing of very young children. More specifically, we estimate versions of the three key relations from his framework using data from the German Socio-Economic Panel (GSOEP) Survey. Our primary models provide evidence that skills are related to involvement in *cognate* activities with a parent, indicating a behavioural relationship between capabilities and activities which is not explicit in Sen's original set-up, but is key to the development and happiness of young children. A second set of models indicates that the daily activities of very young children are related to household income but that in some cases the association with parenting inputs is stronger. Thirdly, we report happiness regressions for the children which seem to suggest that shopping and reading are valued but that their distribution is limited in some cases – probably either by household income or parental education. Across the piece, we find that the number of siblings is negatively related to activity involvement with parents, as hypothesised by Becker, but positively related to everyday, motor and social skills. Combined with evidence from other studies, we conclude that the capability approach provides a useful framework for understanding the economics of wellbeing across the entire life course.

JEL Classification: D60, I31, J13

Keywords: child development, well-being, happiness, daily activities, capabilities

Corresponding author:

Paul Anand  
The Open University  
Walton Hall  
Milton Keynes MK7 6AA  
United Kingdom  
E-mail: [paul.anand@open.ac.uk](mailto:paul.anand@open.ac.uk)

---

\* The authors wish to thank Conal Smith, Ron Smith, Peter Hammond, Vasiliki Totsika, Sarah Cattan, Mariacristina De Nardi as well as participants of Royal Economic Society and OECD-universities research conferences and university seminars in Oxford, York, Sheffield and Turin. We are also grateful to two referees for a series of excellent comments, the Leverhulme Trust for funding much of this research, Amartya Sen for supporting the project of which the paper is part and Jim Heckman for being a member of its advisory board. The usual caveat applies.

# The Development and Happiness of Very Young Children

## 1. Introduction

Two of the most significant innovations in welfare economics during recent years have been the development of the capability approach and the rise of the empirical ‘happiness’ literature.<sup>1</sup> Both approaches have been applied widely to the understanding of adult wellbeing but we can also ask whether they are applicable to the situation of young children. Can we assess and model children’s capabilities and their connections to factors that help them to develop? Can happiness regressions for such children tell us anything about the types and distribution of activities that give pleasure to people at this early stage in life?

For a long time, economists have cautioned that economic welfare cannot provide a comprehensive measure of human wellbeing and in recent years two strands of response have emerged in economics. In one approach, data on happiness, or ‘experienced utility’ enable direct welfare assessments that can complement the traditional inferences made about preference from market behaviour.<sup>2</sup> The second strand, developed and discussed by Sen (1979, 1985), Puppe (1995), Fleurbaey (2008), Anand et al. (2011) and many others, was originally motivated by theoretical problems in utilitarian social choice. From an analytical perspective, the capabilities approach has evolved into an amalgam of ideas concerning the common theme of what people are able to do, allowing for the fact that they produce the outcomes they value from resources at very different rates. This has become a major source of analytical ideas in development and fits with how many people think about wellbeing and fairness in ethical discourse, as Schokkaert (1999) has observed.

These two approaches have sometimes been cast as being at odds, and they do emanate from different normative and methodological traditions within economics. Nonetheless, they share in common a desire to allow a contributory role for non-financial, non-consumption aspects of wellbeing and take the idea of human happiness, or ‘experienced utility,’ seriously. Moreover, the early formal statement of

---

<sup>1</sup> We use the terminology ‘happiness’ somewhat loosely here. To be more precise, various related conceptions have been studied. These typically range from more evaluative measures such as ‘overall life satisfaction,’ to affective, hedonic measures such as how ‘happy’ one feels today (e.g. Diener et al. (2009)). Eudaimonic measures of wellbeing have also been proposed (e.g. White and Dolan (2009)). For a recent discussion in the context of welfare economics, see also Frey and Stutzer (2012).

<sup>2</sup> The term “experienced utility” was coined by Kahneman et al. (1997) to describe the Benthamite conception of utility upon which the happiness literature is ultimately founded.

the capability approach (Sen (1985, pp. 11–14)) allows explicitly for the value of experience, even if it also argues the need for additional metrics of life quality.

Within development and the economics of social issues, however, there is a growing literature on the capability approach and its application to understanding the needs and growth of children – see, for example, a particularly interesting review by Biggeri et al. (2010). Much of this work has tended in the past to use qualitative methods or methods that rely on the use of latent variables. Biggeri et al. (2006), for example, consulted with young children about the consequences of child labour, whilst Addabbo et al. (2014) have shown that joint activities with a parent, designed to promote a child’s development, vary significantly with the sex of the child and the geographical region in which the child is being brought up. In this paper we aim to complement the latter work by highlighting the empirical applicability of Sen’s original three equations – which concern the conversion of resources into acts and states, the generation of happiness through experiences of acts and states, and a person’s ‘advantage’ as measured by the set of things that a person can do or be (Sen (1985 pp. 11–14)). We consider these issues in the context of child development, while noting also that the economic literature has, until relatively recently, contained little on the happiness and capabilities of young children, or indeed on child development generally.

In work that has sought to address this gap – and also inspired by the capability approach, Heckman (2006) has shown that the formation of skills over the life course is a dynamic process, in which early inputs strongly affect the productivity of subsequent inputs. As a result, Heckman (2006 p. 1902) concluded that, “...society overinvests in remedial skill investments at later ages and underinvests in the early years” an underinvestment reflected by the paucity of studies in the economic literature.<sup>3,4,5</sup>

Using household survey data from the German Socio-Economic Panel (GSEOP), we provide estimates for three sets of equations: one set for children’s

---

<sup>3</sup> These findings have been largely corroborated and extended in a number of notable related studies. For example, Cunha and Heckman (2008) discovered that parental inputs have different effects at different stages in the child’s life-cycle, with cognitive skills being more affected at early ages and non-cognitive skills more at later ages. Cunha et al. (2010) found that for most types of disadvantage it is optimal to invest more in the early stages of childhood than in later stages.

<sup>4</sup> For further important studies in this area see Aizer and Cunha (2012), Carneiro et al. (2013) and Duflo (2012). Conti and Heckman (2014) provide an excellent overview of the emerging field.

<sup>5</sup> Some of the key concepts of the capabilities approach have also recently been applied to the analysis of child wellbeing by Phipps (2002), Di Tommaso (2007), Addabbo and Di Tommaso (2011) and Volkert and Wüst (2011).

abilities or skills (indices of movement, talking, social, and everyday skills); one set for nine types of activity (or functioning) engaged in together with the child's mother or main carer (singing children's songs, taking walks outdoors, painting / arts and crafts, reading or telling stories, looking at picture books, going to the playground, visiting other families with children, going shopping, and watching television); and one set for children's happiness. These three sets of equations correspond to the three equations outlined in Sen (1985 pp. 11–14). We believe this is the first paper to estimate all three equations from Sen (1985 pp. 11–14)'s framework for economic dependents this young. Sen's first equation relates to the production of functionings (activities and states) and in this case we propose a 'three factor' model of child welfare, in which the child's activities and states (functionings) are a product of the child-rearing regime, household affluence and the quality of the external environment. We discuss our particular results in due course, whilst noting that our primary purpose is to illustrate the workability and reach of the capability approach as a theory for understanding the economics of life quality.

Before moving on, we must make clear that in this paper Sen's capabilities are interpreted and measured as the abilities a child has, i.e. what a child is able to do. We do not address the freedom aspect of Sen's capabilities concept, i.e. the measurement of opportunity sets or choice sets. In the capability approach, the wellbeing of an individual is evaluated not only in terms of achieved functionings (what people do or are, such as being well fed or adequately sheltered), but also in terms of the freedom to choose different functionings. This approach, referred to by Sen as well-being freedom, relates to the freedom to achieve those things that are constitutive of one's well-being. This aspect of the capability approach is not developed in this paper – except insofar as the early development of good cognitive and non-cognitive skills might be regarded as being weakly positively correlated with having larger future opportunity sets.

The rest of the paper is structured as follows. In Section 2, we introduce the theoretical framework, focusing particularly on how a formal version of the capability approach in welfare economics can be applied to the development of skills and happiness in very young children. In Section 3 we describe the data and methods used whilst our main empirical results are presented and discussed in Section 4. Concluding remarks are offered in Section 5.

## 2. Theoretical framework

The formal statement of Sen's theory centres around three key equations which pertain to the transformation of resources into activities, the production of 'experienced utility' (or happiness) and the measurement of the activities that a person could engage in, given their resources and personal characteristics (abilities and identity).

These equations are consistent with and motivated by concerns about the limitations of traditional utilitarianism for providing the foundations for welfare economics, as discussed by Sen (1979). In this paper we estimate versions of all three of these equations, in the special context of very young children. At this developmental stage of life, it is plausible that the activities a child engages in might have a causal impact on their capabilities and we extend the standard framework to reflect this.<sup>6</sup>

We begin by introducing some notation. We assume that the  $i$ -th individual is endowed with a finite vector of  $k \in \mathbb{N}$  resources given by  $\mathbf{r}'_i = (r_{i1}, \dots, r_{ik}) \in \mathbb{R}^k$ . We suppose also that there is a finite number  $m \in \mathbb{N}$  of types of personal characteristics, or abilities, that any individual might have and be able to use to transform resources into activities and states. Individual  $i$  has a vector of personal abilities given by  $\mathbf{c}'_i = (c_{i1}, \dots, c_{im}) \in \mathbb{R}^m$ .

People can use their abilities to convert resource endowments into various activities or functionings, indexed by  $j$ . We assume that there exists some finite number  $n \in \mathbb{N}$  of types of possible functionings. Individual  $i$  then has a vector of functionings given by  $\mathbf{f}'_i = (f_{i1}, \dots, f_{in}) \in \mathbb{R}_+^n$ .<sup>7</sup>

People convert resource endowments into functionings at different rates, and in different ways, because the relevant personal characteristics are heterogeneous.

---

<sup>6</sup> There is certainly some evidence for this in the child development literature. For example, Whitehurst and Lonigan (1998) have discussed the beneficial impact of a variety of activities on the early stage development of reading ability. These include increasing children's experience with picture books and other literacy materials, dialogic reading, exposure to activities such as alphabet boards, learning to print their names and playing rhyming games. In a study of children aged 3-4 years, MacDonald and Parke (1984) found that physical play and engagement between fathers and children and verbal interactions between mothers and children were positively related to children's social skills, especially for boys. The extent of verbal instructions from the mother was positively linked with their daughters' social skills; in contrast, paternal verbal instructions were negatively associated with social skills for both genders.

<sup>7</sup> The functionings data available in this study are ordinal, reflecting the frequency with which various activities are performed. We choose to adopt the richer domain of  $\mathbb{R}_+^n$  rather than  $\mathbb{Z}_+^n$ . This is partly to elucidate the framework in its full generality. However, it is also more consistent theoretically with our subsequent use of ordered probit models.



This conversion process is captured by the production function  $\theta_j(\cdot)$ , in the first of (our version of) Sen's three core equations.

$$f_{ij} = \theta_j(r_{i1}, \dots, r_{ik}, c_{i1}, \dots, c_{im}). \quad (1)$$

In the second key element of the capabilities approach, individual  $i$  is assumed to derive utility, dependent on the various activities and states they engage in and also, as before, some traits specific to the person. This is given by:

$$u_i = \lambda_i(f_{i1}, \dots, f_{in}; \mathbf{r}'_i, \mathbf{c}'_i). \quad (2)$$

Equation (2), where utility is dependent on activities, emphasises the fact that Sen's theory does have an experiential aspect to it and has, perhaps, more in common with the 'happiness' approach to welfare economics than is sometimes emphasised. The utility in (2) can simply be interpreted as 'experienced utility' or happiness.

For Sen (1985, pp. 11–14), and as is clear from equation (2), 'experienced utility' (or happiness) is indeed important. It is important intrinsically and it may also provide evidence about a person's underlying values relevant for welfare assessment, for example, by illuminating the importance of specific functionings. The key point of departure is that for Sen (1985, pp. 11–14), equation (2) on its own does not capture the full picture. Also important is the third and final element of his approach to welfare economics. This is the idea that in addition to experienced utility, the set of opportunities available to an individual can also be relevant to an assessment of their welfare status, something he calls their "advantage" (e.g. Sen (1985b, p. 195)). We suppose that individual  $i$  has a vector of capabilities in an  $s$ -dimensional space of freedoms given by  $\mathbf{q}'_i = (q_{i1}, \dots, q_{is}) \in \mathbb{R}^s$ , where the value of  $q_{ij}$  is determined by the following production function  $\varphi_j(\cdot)$ :

$$q_{ij} = \varphi_j(r_{i1}, \dots, r_{ik}, c_{i1}, \dots, c_{im}).^8 \quad (3)$$

The vector  $\mathbf{q}'_i$  describes what individual  $i$  is free to do, or capable of doing, given their resources and personal traits or abilities. The greater the value of  $q_{ij}$ , the

---

<sup>8</sup> We adopt  $\mathbb{R}^s$  as the capabilities domain rather than  $\mathbb{N}^s$  for similar reasons to those discussed in footnote 7 in the context of functionings.

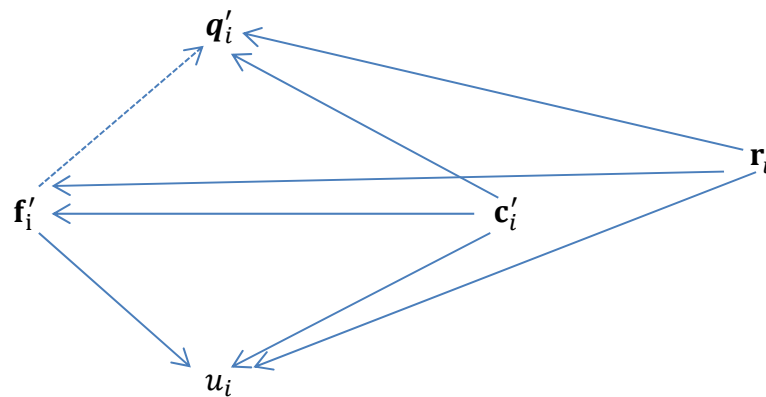
greater is the extent of person  $i$ 's freedom, or capability, in dimension  $j$ . In Sen's account of his theory, the elements of  $\mathbf{q}'_i$  are treated as definitive but as we have discussed, application to young children raises the possibility of a causal relationship with functionings, since it is reasonable to posit that engaging in particular activities might help to develop a child's abilities.<sup>9</sup>

The arguments in equations (1) and (3) are the same. It is therefore possible to extend Sen's framework, in a manner not inconsistent with it, by formulating a capability as a function  $\psi_j(\cdot)$  of functionings, i.e.

$$q_{ij} = \psi_j(f_{i1}, \dots, f_{in}; \mathbf{r}'_i, \mathbf{c}'_i) \quad (4)$$

The set of equations (1), (2) and (4) are illustrated visually in Figure 1. Our addition to Sen (1985, pp. 11–14)'s framework is indicated by the dotted line, where activities (functionings) can impact on ability (capability).

**Figure 1. Visual representation of relationships between functionings, capabilities, experience utility, resources and personal traits**



In this study we estimate econometrically versions of (1), (2) and (4). Before turning to the data and methods used to estimate these regressions, some discussion of the nature of resource endowments in the present context is in order. These play a vital role in (1) and are of implicit importance in (2) and (4). How might we conceive of these endowments?

We hypothesise that the key resources available can usefully be broken down into a small number of factors which include the *child rearing regime, household*

---

<sup>9</sup> In Sen (1985)'s formulation, the capability set is defined as the set of all functionings that an individual is free to engage in, given their resources and abilities.

*affluence* and the *external environment*. These factors serve to classify the potential drivers of child development and therefore play a role analogous to the traditional factors of land, labour and capital in production analysis.

To make the idea of a regime more concrete, we might think of it as comprising the rules that govern the child's upbringing and the amount of time spent with parents or close family members. Human capital may play a role too, either directly, because education suggests different ways of doing things, or because it puts people into different socio-economic groups with different child-rearing norms.

A second factor, household affluence, signifies that conventional economic status, measured by income, should play a significant role in the quality of a child's upbringing. In general, higher incomes will enable parents to provide their children with a wider range of consumption activities, though there is a small amount of psychological evidence that for children of very rich parents, there may be negative returns to economic status, where high incomes are associated with limited access to parents (see Luthar (2003)).

Finally, the external environment may also play a role in the activities a child enjoys. This certainly includes the richness of the physical environment, for example whether there are parks or accessible green spaces close by, but the environment might also be thought of as comprising social norms and cultural aspects. As well as highlighting certain activities as being desirable, these social and cultural factors may affect the extent to which physical environmental assets are useable. For example, public spaces and other amenities may be difficult to use where crime rates are high.

In short, whilst children may not be consumers in the sense of having incomes or making purchase decisions directly, their welfare status is certainly determined by the resources to which they have access. The three factor model helps to conceptualise the way in which this welfare is produced and is used to guide our estimation of (1), (2) and (4).

### **3. Data and Methods**

The data are derived principally from mother and child surveys conducted annually between 2007 and 2010 as part of the main national German household

survey (GSOEP).<sup>10</sup> These surveys give rise to a pooled cross-section of up to 815 observations. The focus is on children aged two and three years old in 2007, 2008, 2009 and 2010.<sup>11</sup> This pooled cross-section was then merged with a variety of data on household and parental characteristics from other surveys within the GSOEP.<sup>12</sup> The variables used in the study and some summary statistics are displayed in Table 1. The survey questions, from which they are derived, together with some further descriptive statistics, are summarised in Online Appendices A and B, respectively.

Our indicator of ‘child happiness’ is constructed using ordinal data on a four point scale, according to the extent to which the mother agrees that her child is ‘usually happy and content.’

**Table 1. Summary Descriptive Statistics**

	n	Mean	Std dev	Min	Max
Child happiness	814	3.737	0.468	1	4
Singing	815	3.256	0.923	1	4
Walking	815	3.571	0.615	1	4
Painting	815	2.880	0.870	1	4
Reading	815	3.463	0.824	1	4
Picture Books	815	3.674	0.586	1	4
Playground	815	2.544	0.898	1	4
Visiting	815	2.199	0.733	1	4
Shopping	815	2.571	0.716	1	4
TV	815	2.664	1.067	1	4
Male	815	0.480	0.500	0	1
Age (mnths)	815	33.545	4.021	26	47
Days in Hosp	813	0.846	5.776	0	135
HH Equiv Income (Euros)	815	19 482.14	10 179.92	0	129 532.20
Mother Immigrant	805	0.094	0.293	0	1
Mother’s age (years)	805	33.494	5.714	19	49
Mother’s educ	778	12.976	2.821	7	18
Mother not working	815	0.377	0.485	0	1
Mother’s health	805	3.670	0.821	1	5
Single parent	805	0.255	0.436	0	1
Grandparent hours	809	5.168	8.1625	0	72
Daycare hours	814	11.545	14.737	0	50
Number of siblings	801	0.943	1.030	0	9
TV disallowed	815	2.411	0.772	1	3
East Germany	814	0.256	0.436	0	1
Good neighbourhood	228	0.895	0.308	0	1
Crime	175	1.909	0.580	1	4
Talking ability	810	4.231	1.076	0	5
Everyday skills	810	2.399	1.504	0	5
Movement skills	806	3.602	1.081	0	5
Social skills	812	4.081	1.077	0	5

Notes: 1. All data based on respondent reports; 2. Scale for activities from singing to TV: 1=never, 2=fortnightly, 3=weekly, 4=daily

<sup>10</sup> Very occasionally a father is interviewed instead of a mother. This is the case in just 4 of our 815 observations. For simplicity, we ignore this from here on and refer to all respondents as ‘mothers.’

<sup>11</sup> Each year, this component of the GSOEP, entitled “Your Child at the Age of 2-3 Years,” is asked to mothers who had a child born three calendar years previously. For example, the 2007 survey contains data on children born anytime between 1<sup>st</sup> January 2004 and 31<sup>st</sup> December 2004.

<sup>12</sup> As usual with household survey data, it is important to bear in mind the possibility of declaration bias. There is a sizeable literature, particularly, on the misreporting of income in surveys - for example to avoid the risk of being required to make tax payments. In some of the more subjective data in this dataset, such as child abilities or happiness as assessed by the mother, we posit that there is likely to be less bias than in income variables, but perhaps more noise.

Also central to the study are ordinal data on functionings. There are data on nine classes of functioning activity: ‘singing children’s songs with or to the child,’ ‘taking walks outdoors,’ ‘painting or doing arts and crafts,’ ‘reading or telling stories,’ ‘looking at picture books,’ ‘going to the playground,’ ‘visiting other families with children,’ ‘going shopping with the child’ and ‘watching television or videos with the child.’ The frequency with which the child experiences these activities (with the main carer) is measured on a four point scale, from ‘never’ (1) to ‘daily’ (4).<sup>13</sup> Binary (dummy variable) versions of these functionings data were also created to indicate whether or not the activity takes place ‘at least several times a week.’

Perhaps the most distinctive aspect of the capabilities approach involves the measurement of capabilities. The GSOEP provides categorical data on four types of capabilities related to talking, everyday skills, movement, and social skills, each of which is measured by responses to ability questions in five sub-dimensions. This follows an operational approach developed, for example, by Anand et al (2009), which focuses on the development of indicators of what a person can do. The capabilities or skills that young children possess are indicators of what they can do, but it should be recognised that these are essentially ‘small world’ indicators. They do not tell us much, if anything, about wider issues such as the life chances they will enjoy, stemming for example from the social status of their family or the human capital they acquire as a result of educational inputs in childhood and beyond. The set of things a child can do by virtue of his or her abilities provides only limited insight into the set of all things they will ultimately be able to do in their life-time. This may nonetheless be important information, and many empirical applications of the capability approach are likely to similarly restrict their focus to small sets of freedoms. (The term freedom can have political connotations but Sen’s original formal definition in terms of a set of feasible functionings, conditional on resources and conversion factors, is clearly not limited to any particular domain). In any case, we obtain summary indicators for each of these four domains by employing a ‘threshold plus counting’ method, the essentials of which have been discussed in the literature on poverty measurement (see, for instance, Alkire and Foster (2011)).

As an illustration, for capabilities related to talking, we have five sub-dimension indicators, each of which takes the response ‘yes,’ ‘partly’ or ‘no.’ Since

---

<sup>13</sup> The order in the GSOEP data-set actually runs in the other direction. We reversed the order for convenience.

nearly all the data are covered in each sub-dimension by ‘yes’ and ‘partly,’ with only a small number of outliers, binary indices based on these two categories were created,  $q_{ij} \in \{0,1\}$ , where  $i$  denotes the individual and  $j \in \{1, \dots, 5\}$  denotes the  $j$ -th sub-dimension. A summary index of talking capability for the  $i$ -th individual,  $Q_i^{talk}$ , was then created by summing over the five sub-dimensions, i.e.  $Q_i^{talk} = \sum_{j=1}^5 q_{ij}$ . A maximum score of five therefore indicates that the child can do five kinds of things related to speech, whilst a minimum score of zero indicates that the child can do all five kinds of things only partly, or not at all. Similar indices were constructed for everyday skills ( $Q_i^{eskills}$ ), movement skills ( $Q_i^{move}$ ), and social skills ( $Q_i^{social}$ ).<sup>14</sup>

Counting sub-dimensions in this way is consistent with the view that either each sub-dimension is equally indicative of ability or, more pertinently, that there is not sufficient justification for attaching different weights to different sub-dimensions.

Our data-set contains three important variables on child characteristics; the age of the child in months, ‘age (mnths),’ a health related variable corresponding to the number of days spent in hospital in the last 12 months, ‘Days in Hosp,’ and a dummy for being ‘male.’

The remaining variables relate to various resources the child has access to. Consistent with the framework outlined in the previous section, these can be thought of as being categorised into the child-rearing regime, household affluence, and neighbourhood quality.

We have available quite a wide range of indicators of the *child-rearing regime*. ‘Mother Immigrant’ is a dummy variable indicating whether the child’s mother is an immigrant or German-born. ‘Mother’s age’ signifies the age of the child’s mother in years. ‘Mother’s education’ is the child’s mother’s number of years of education or training. ‘Mother not working’ is a dummy variable taking the value ‘1’ if the child’s mother is not working either full-time or part-time. ‘Mother’s health’ is the child’s mother’s self-reported health status, measured on a five point scale from ‘bad’ to ‘very good.’ ‘Single parent family’ is a dummy variable taking the value ‘1’ if the child’s mother claims to be ‘married’ and ‘0’ if she describes herself as ‘single,’ ‘widowed,’ ‘divorced’ or ‘separated.’<sup>15</sup> ‘Grandparent hours’ refers to the number of hours in which the child is cared for by grandparents “in a normal week,” while

---

<sup>14</sup> The five sub-dimensions for each of the four broad categories of skills are described in Appendix A.

<sup>15</sup> There is no option in the survey for ‘living with partner as if married.’

‘Daycare hours’ is the number of hours which the child spends in a nursery, again “in a normal week.” We also have data on a child’s number of siblings (‘Num siblings’) and categorical data on the extent to which watching TV or videos alone is discouraged (‘TV disallowed’). Finally, we have data on the self-reported life satisfaction of the child’s mother (‘Mother’s happiness’).

*Household affluence* (economic welfare in a narrow sense) is captured simply by our ‘HH Equiv Income’ variable.<sup>16</sup> This was derived from the GSEOP’s variable for household net income (after deduction of taxes, social security, unemployment and health insurance), using the Modified OECD equivalence scale to adjust for differences in household size and composition.

An obvious candidate for capturing important social and cultural aspects of the *external environment* is simply whether a household lies within the former East or West Germany; it is well documented that very significant differences persist between the two regions with respect to lifestyle, wealth, political views and a range of other matters. ‘East’ is a dummy variable taking the value ‘1’ if the household is located in the former East Germany.<sup>17</sup>

As outlined in Section 2, we use these data to estimate versions of (1), (2) and (4). In each of these regressions, the dependent variable is ordinal; measured on a four point scale in (1) and (2) and a six point scale in (4).<sup>18</sup> These regressions are estimated using ordered probit models, with robust standard errors, and 2SLS.<sup>19</sup>

#### 4. Results

We begin by noting that throughout the following results, link tests find that the null hypothesis of no misspecification is never rejected at conventional

---

<sup>16</sup> In Appendix E we also include a variable on size of home in estimations of equation (2).

<sup>17</sup> There are, of course, many aspects of the external environment which could play a role here. Inevitably, we are constrained to some extent by the available data. A variable on respondents’ overall perception of neighbourhood quality, ‘Good neighbourhood,’ was available in the GSEOP but, unfortunately, only for 2007 so we were forced to omit this from our main analyses. However, analogous results for our estimation of equation (2) are reported with this variable included in Appendix E.

<sup>18</sup> The dependent variable in our version of (2) is ‘child happiness.’ We estimate a number of versions of (1) where the dependent variable in each case is one of the nine ordinal functionings variables. We also estimate a number of versions of (4), where the dependent variable  $q_{ij}$  is taken to be  $Q_i^{talk}$ ,  $Q_i^{skills}$ ,  $Q_i^{move}$  or  $Q_i^{social}$ .

<sup>19</sup> OLS regressions were also run and yielded very similar results, as is often the case.

significance levels in any of the ordered probit models.<sup>20</sup> We consider, in turn, results relating to predictors of activity involvement, child happiness and links between activity involvement and skill development.

#### 4.1 Production of activities

Results of our ordered probit estimation of (1), for each of the nine functionings, are displayed in Table 2.<sup>21</sup> We begin by considering indicators of the child-rearing regime. Maternal higher education is significantly associated, at the 1% level, with greater frequency of singing children's songs, reading or telling stories and looking at picture books. Conversely, it is significantly negatively associated, at the 1% level, with watching TV or videos, and at the 5% level with going shopping and going to the playground.

Consistent with the ideas of Becker and Lewis (1973), activities are negatively related to the number of siblings. *Ceteris paribus*, having more siblings is negatively associated with the frequency of all nine functionings and, apart from going to the playground and going shopping, the association is statistically significant in all cases.

There is also evidence of cultural differences. Having a non-German mother is found to be positively associated with going to the playground and visiting other families, effects which are statistically significant at the 1% and 10% levels, respectively. Conversely, it is negatively associated, at the 1% significance level, with reading or telling stories.

Having an older mother is positively associated, at the 5% significance level, with looking at picture books and, at the 10% level, with singing children's songs. It is also negatively associated, at the 10% level, with trips to the playground. Having a mother who is not working has a positive impact, significant at the 1% level, on the frequency of visiting other families with children. It is also positively associated with going for walks outdoors, an effect which is statistically significant at the 10% level. Children whose mothers have better health engage in reading or telling stories and

---

<sup>20</sup> A link test is a popular type of RESET test, developed by Pregibon (1979) and based on an earlier idea by Tukey (1949). We use link tests to test for misspecification in our various estimations of (1), (2) and (4).

<sup>21</sup> As a robustness check, analogous regressions to our functionings models reported in Table 2, but which control for reporting style using data on mother's happiness, were run. The results are qualitatively very similar and are deferred to Appendix C.



looking at picture books and going for walks more frequently, effects that are statistically significant at the 1%, 10% and 10% levels, respectively.

**Table 2. Models of Activities as Functions of Financial and Parenting Resources**

	Sing	Walk	Paint	Read	Pictbks	Play	Visit	Shop	TV
HH Equiv Income	0.091 (0.056)	-0.033 (0.049)	0.108** (0.046)	0.121* (0.063)	0.073 (0.062)	0.078* (0.046)	0.006 (0.054)	-0.073* (0.040)	-0.091** (0.045)
East Germany	0.006 (0.122)	0.185 (0.124)	0.096 (0.107)	-0.387*** (0.119)	-0.129 (0.129)	0.072 (0.111)	-0.145 (0.112)	-0.110 (0.104)	0.263** (0.109)
Mother Immigrant	-0.266 (0.163)	0.251 (0.175)	0.091 (0.143)	-0.418*** (0.155)	-0.081 (0.183)	0.669*** (0.153)	0.359** (0.166)	0.252 (0.157)	0.126 (0.145)
Mother's age	0.017* (0.009)	0.007 (0.009)	0.000 (0.009)	0.006 (0.010)	0.024** (0.009)	-0.016* (0.008)	-0.006 (0.009)	0.012 (0.008)	0.008 (0.009)
Mother's education	0.055*** (0.018)	-0.014 (0.018)	-0.002 (0.016)	0.100*** (0.019)	0.074*** (0.021)	-0.034** (0.017)	-0.011 (0.016)	-0.036** (0.017)	-0.075*** (0.017)
Mother not working	-0.138 (0.095)	0.176* (0.103)	0.142 (0.093)	-0.029 (0.102)	0.124 (0.112)	0.063 (0.089)	0.251*** (0.092)	0.016 (0.093)	-0.052 (0.093)
Mother's health	0.023 (0.055)	0.113** (0.055)	0.076 (0.050)	0.190*** (0.051)	0.119** (0.057)	0.035 (0.047)	0.050 (0.052)	-0.048 (0.051)	0.010 (0.051)
Single parent	-0.202* (0.106)	-0.067 (0.114)	-0.108 (0.099)	-0.084 (0.108)	-0.033 (0.117)	0.008 (0.100)	0.016 (0.101)	-0.058 (0.101)	0.161 (0.099)
G'parent hours	-0.011* (0.006)	0.000 (0.006)	0.002 (0.005)	-0.001 (0.006)	0.001 (0.006)	-0.002 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.006 (0.005)
Daycare hours	0.005 (0.004)	-0.007* (0.004)	-0.003 (0.003)	0.002 (0.004)	-0.002 (0.004)	0.002 (0.003)	0.000 (0.003)	-0.014*** (0.003)	-0.003 (0.003)
Num siblings	-0.103* (0.053)	-0.106** (0.047)	-0.111** (0.047)	-0.120*** (0.044)	-0.184*** (0.052)	-0.006 (0.044)	-0.113** (0.047)	-0.042 (0.044)	-0.121*** (0.044)
TV disallowed	0.163*** (0.057)	0.092 (0.059)	0.039 (0.054)	0.121** (0.057)	0.084 (0.061)	0.132** (0.056)	0.157*** (0.055)	0.092 (0.057)	-0.357*** (0.053)
Controls for Child Sex, Age and Health	Yes in all models								
Year dummies	Yes in all models								
N	754	754	754	754	754	754	754	754	754
Pseudo R-Sq	0.0712	0.0319	0.0241	0.0847	0.0659	0.0299	0.0330	0.0429	0.0572
AIC	1640.946	1272.372	1860.148	1383.97	1047.808	1924.026	1641.058	1599.484	1984.304
BIC	1738.079	1369.505	1957.281	1481.104	1144.941	2021.159	1738.191	1696.618	2081.437
Linktest	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes: (i) Ordered probit model results reported; (ii) Here and in subsequent tables, HH Equiv Income is expressed in tens of thousands of Euros.

Spending more time being cared for by grandparents is negatively associated, at the 10% significance level, with frequency of singing children's songs. Spending more time in nurseries is associated, not surprisingly, with going for fewer walks and spending less time going shopping. These effects are statistically significant at the 10% and 1% levels, respectively. Disallowing the child to watch TV or videos alone has a positive impact on the extent to which all the functionings occur, apart from, perhaps not surprisingly, watching TV or videos with the main carer. These effects are statistically significant at the 5% level or lower for singing children's songs,

reading or telling stories, going to the playground and visiting other families with children.

Household income has a positive and significant impact on the frequency of painting or arts and crafts. Conversely, greater levels of income were found to be significantly negatively associated with the frequency of watching TV or videos and we suggest both effects are plausible. With regard to the external environment, being located in East Germany was found to have a statistically significant negative impact on the frequency of reading or telling stories. Conversely, it is positively associated, at the 5% level, with the frequency with which carer and child watch TV or videos together. In summary, all three of our hypothesised resource factors find some empirical support.

A possible concern, and one which applies even more so to our subsequent estimation of equations (2) and (4), is the effect that the mother's reporting style might have on the results, since both dependent and independent variables are self-reported. This type of issue is very common with survey data and there are no definitive answers. One possibility here is to take the respondents' own reported happiness levels as a proxy for reporting style and to include this as an additional explanatory variable. A slightly more refined approach is to take the residual from a regression of mother's happiness on a range of covariates, and use this, rather than mother's happiness, as an extra covariate. This has the advantage that it more cleanly represents the 'unexplained' component of mother's happiness. Both approaches are found to yield very similar results to those discussed above, and are deferred to Appendix C.

## **4.2 Child happiness**

Before turning to the results of our estimation of equation (2), it is helpful to recall that there are several respects in which the dependent variable 'child happiness' could plausibly be associated with the 'mother's happiness' variable. Firstly, a mother's happiness may have a direct effect on her child's level of happiness; having a brighter, more positive mother may simply have a beneficial impact on a child's mood so we include 'mother's happiness' as an additional explanatory variable in (2). Secondly, however, as discussed above, both variables are reported by the mother. It is possible that mothers who exaggerate (or understate) reports of their own life-satisfaction might exaggerate (or understate) reports of their child's life-satisfaction in

**Table 3. Models of Child Happiness**

	O Probit	O Probit	O Probit	O Probit	O Probit	2SLS
B Singing	-0.013 (0.126)	-0.039 (0.127)	-0.075 (0.139)	-0.118 (0.144)	-0.112 (0.143)	-0.053 (0.044)
B Walking	0.155 (0.200)	0.117 (0.201)	0.164 (0.211)	0.188 (0.213)	0.171 (0.213)	0.040 (0.069)
B Painting	0.195* (0.105)	0.155 (0.107)	0.050 (0.116)	0.057 (0.117)	0.050 (0.117)	0.016 (0.037)
B Reading	0.280* (0.147)	0.310** (0.148)	0.373** (0.164)	0.364** (0.161)	0.354** (0.162)	0.109*** (0.056)
B Picture books	0.244 (0.261)	0.238 (0.259)	0.124 (0.277)	0.113 (0.278)	0.118 (0.277)	0.074 (0.092)
B Playground	-0.015 (0.100)	0.006 (0.102)	0.008 (0.111)	-0.020 (0.111)	-0.015 (0.112)	-0.011 (0.034)
B Visiting	0.099 (0.106)	0.098 (0.107)	0.046 (0.117)	0.057 (0.117)	0.050 (0.117)	0.018 (0.037)
B Shopping	0.204** (0.097)	0.200** (0.097)	0.212** (0.106)	0.208* (0.107)	0.210** (0.107)	0.070** (0.034)
B TV	-0.188* (0.097)	-0.177* (0.097)	-0.179 (0.110)	-0.160 (0.110)	-0.158 (0.110)	-0.039 (0.035)
Child age (mnths)		-0.009 (0.012)	0.002 (0.014)	0.001 (0.014)	0.002 (0.014)	-0.001 (0.004)
Child sex (Male=1)		-0.180* (0.096)	-0.208** (0.105)	-0.234** (0.106)	-0.227** (0.106)	-0.070** (0.033)
Child hospitalised (Days)		-0.013*** (0.004)	-0.012*** (0.004)	-0.011*** (0.004)	-0.011*** (0.004)	-0.004 (0.003)
HH equivalent income			-0.077 (0.055)	-0.078 (0.056)	-0.081 (0.056)	
East Germany			0.284** (0.144)	0.312** (0.146)	0.297** (0.146)	0.110** (0.043)
Mother immigrant			0.447** (0.207)	0.412** (0.206)	0.388* (0.207)	0.110* (0.062)
Mother's health			0.141** (0.062)		0.079 (0.069)	
Controls for mother's age, education employment			Yes	Yes	Yes	Yes
Single parent family			-0.130 (0.132)	-0.093 (0.134)	-0.095 (0.134)	
Number of siblings			-0.048 (0.056)	-0.046 (0.057)	-0.048 (0.057)	-0.020 (0.017)
Grandparent hours			0.013* (0.007)	0.013* (0.007)	0.012* (0.007)	0.003 (0.002)
Daycare hours			-0.008* (0.004)	-0.007* (0.004)	-0.008* (0.004)	-0.003*** (0.001)
Mother's happiness				0.101*** (0.032)	0.087** (0.035)	0.063** (0.029)
Year Dummies		Yes for all models				
AIC	984.8204	982.9452	864.2896	851.8548	852.5011	
BIC	1055.35	1067.536	998.3875	985.6818	990.9428	
Linktest	Pass	Pass	Pass	Pass	Pass	
N	814	812	753	746	746	746

Notes: (i) Year dummies not significant. (ii) In 2SLS regression, (a) Mother's happiness is instrumented with 'Mother's health,' 'HH equivalent income,' and 'Single parent family,' (b) 1<sup>st</sup> stage F-stat=36.9, rejecting null hypothesis of weak instruments; (c) Sargan test of overidentifying restrictions fails to reject null hypothesis that the restrictions are valid (p-value=0.333) (d) Wu-Hausman test fails to reject null hypothesis that variables are exogenous (p-value=0.253).

a similar manner. Finally, there could also be reverse causality whereby having a happier child has a positive causal impact on parental happiness. Since the latter two possibilities give rise to endogeneity, we attempt to address this using instrumental variables.

The results of ordered probit estimation of (2), relating experienced utility, or happiness, to functionings, are presented in Table 3. The baseline regression reported in column 1 contains the binary versions of our nine functioning variables. Child-specific characteristics of age, sex and our proxy for health are also included in specification 2 and the various resources described in the previous section added in the specifications in columns 3–6. The distinctions between models 3 to 5 regard the inclusion of ‘mother’s health’ and ‘mother’s happiness.’ The former variable is included in 3, the latter is included in 4, and both variables are included in 5. When just mother’s health is included (column 3), it is significant at the 5% level, indicating that healthier mothers are associated with happier children. When just mother’s happiness is included (column 4), it is even more significant (p-value is 0.002), indicating that having a happier mother is associated with being a happier child – though as noted above, we cannot rule out the possibility that the association is an artefact arising from the mother reporting both variables. Not surprisingly, mother’s health and mother’s happiness are positively correlated (0.367) so if one of these variables is omitted, the other one’s coefficient could be biased upwards.

In model 5, when we include both variables, we find that it is Mother’s health which loses its significance, while Mother’s happiness is still significant at the 5% level (p-value 0.013). Since Mother’s health is no longer significant in the child happiness regression, there is an argument that it could be a good instrument for Mother’s happiness. In regression 6 we therefore instrument Mother’s happiness with Mother’s health (and also with being a single parent and HH equivalent income). The identifying restriction here is the assumption that the only way that mother’s health, income, and being a single parent family, influence the child’s happiness is through the mother’s happiness. Statistically, these results are strong. Mother’s happiness remains significant at the 5% level (p-value is 0.032), while the first stage F-stat is 36.9, firmly rejecting the null hypothesis of weak instruments. The Sargan test of over-identifying restrictions fails to reject the null hypothesis that the restrictions are valid (p-value=0.333). However, a Wu-Hausman test fails to reject the null hypothesis that the variables are exogenous (p-value=0.253). On this basis, together with the

information criteria, model 4 is our preferred one overall.<sup>22</sup> However, the results are qualitatively very similar in all models, especially in models 3 through to 6.

Reading or telling stories was found to be positive and statistically significant at the 5% level. Shopping was found to be positive and statistically significant at the 10% level. None of the other functionings had a statistically significant association with child happiness in our preferred specification 4, though painting and arts and crafts and watching television had marginally significant positive and negative associations, respectively, in our baseline regression 1.

It might seem surprising that so few of these activities were found to have a statistically significant impact on child happiness. One possible explanation, which would echo results by Anand et al. (2015) in the context of older individuals, is that whether or not certain activities are statistically significantly associated with happiness may reflect whether some children are getting a suboptimal amount of an activity, relative to what they would ideally like. Interpreted in this way, the positive statistically significant coefficient of reading suggests that this is an activity, positively associated with happiness, which is constrained for some children. It has been suggested that IQ, for which there is unfortunately no good proxy in our data, could be the source of an alternative explanation, as it might have a positive effect on both time spent reading and on happiness.<sup>23</sup> (The two possible explanations need not, of course, be mutually exclusive).

Looking at maternal education and its association with parenting activities in Table 2, it is clear that it is positively related to a group of book or word related activities, while there is a negative relationship with trips to the playground, shopping and watching television. This echoes previous findings which suggest that while education is a marker for literacy, literacy levels which shape parenting practices like reading vary within particular educational levels, within what health researchers regard as at risk subpopulations (Green et al. (2009)). The pathways to happiness via reading together could be through either its pure entertainment value, or the fact that, for very young children, reading with a parent involves close social interactions with the primary carer. At the least, these data are suggestive of lack of maternal education

---

<sup>22</sup> Both AIC and BIC are found to decrease from models 1 through to 4, and to increase very marginally in model 5.

<sup>23</sup> We are particularly grateful to one of the referees for raising this point.

constraining those types of parental activities where educational inputs are particularly relevant.

With regard to the variables on child characteristics, stays in hospital was found to be negative and statistically significantly associated at the 1% level, suggesting that poor health can have an important detrimental impact on the happiness of young children. Being male was also found to have a negative association, significant at the 5% level. The age of the child was not found to have a significant association with their happiness.

Turning to the impact of resources on child happiness, aside from mother's happiness, the other main statistically significant variables in our preferred specification are living in the former East Germany and mother being an immigrant, both of which are positively associated with child happiness at the 5% level.<sup>24</sup> If these effects are genuine, the explanation may be similar to that proposed for the empirical evidence compiled by Bertoni (2015), that people exposed to bad conditions in childhood adopt more positive subjective scales to report life satisfaction. Those in the East might, for example, feel their prospects are better now, compared with what they were in the not so distant past. This would be consistent with Frijters et al. (2004), who found evidence of a freedom dividend in the former East Germany following reunification. The children in this study are, of course, too young to remember a time when East and West Germany were segregated, but it is conceivable that there is an optimism among their close contacts which rubs off on them.<sup>25,26</sup> Finally, it should be borne in mind that the significance of the association only holds after controlling for a number of important resources; in the raw data, there is no significant difference between child happiness in the East and West.

### **4.3 Activity Involvement and Skill Development**

In terms of relations between activities and skills, the results of ordered probit estimations of (4), for the four capability measures corresponding to talking skills,

---

<sup>24</sup> There was also a marginally significant positive association between child happiness and hours spent being cared for by grandparents, and a marginally significant negative association with hours spent in daycare.

<sup>25</sup> It is also possible, of course, that the finding is a reporting effect related to the more positive subjective scales among East German mothers. That explanation is not, however, very consistent with the fact that the East Germany coefficient is actually most significant in the 2SLS regression.

<sup>26</sup> Similar lines of argument could be applied to the positive association with the mother being an immigrant.

everyday skills, movement skills and social skills, respectively, are displayed in Table 4. In our baseline models, these capabilities were regressed on all nine of the binary functioning variables as well as child characteristic variables for age, sex and health. These models were then expanded with variables relating to resources. As can be seen from Table 4, in all four cases the expanded model is preferred according to both the AIC and BIC criteria and a number of results merit comment. Reading or telling stories and singing children's songs are both found to have a positive impact on talking capabilities, significant at the 1% level. Perhaps slightly less obvious, though still plausible, is the finding that visiting other families with children has a positive impact on talking ability, significant at the 10% level.

Singing children's songs and painting and doing arts and craft are found to have a positive impact on the development of movement skills, significant at the 5% and 1% levels, respectively. These results also seem plausible. Painting / drawing recognizable shapes on paper and cutting paper with scissors are two of the five components of the variable  $Q_i^{move}$  so this may be partly a case of 'practice makes perfect.' Singing songs with children often involves 'actions' and it seems possible that this might be a mechanism through which movement skills could be developed. Superficially it is less clear why taking walks outdoors is negatively associated with movement skills but at this age the child might often be in a buggy and have less opportunity to develop movement skills than they would through other activities. If the effect is genuine, it may be a result of the child spending less time doing other activities which would more actively promote such skills.

Another notable finding is that visiting other families with children has a positive impact on the development of social skills, statistically significant at the 1% level. Singing children's songs and reading or telling stories were also found to have positive impacts in this domain, though the effect of the latter is only significant in the baseline model and, even then, only at the 10% level. Taken together, these findings help to make the point that social and other non-cognitive skills might be developed by activities that only partly overlap with those that help to develop cognitive skills.

In our results on the development of everyday skills, positive effects were found of going to the playground (10% level), visiting other families with children (5% level) and going shopping (5% level). Somewhat in contrast to the other capability models, it is not entirely obvious why these particular activities should

stand out as having the most significant impact in this domain. This particular constellation of coefficients might tell a developmental story but it could also be indicative of targeting by the parent to the child's interests or skill levels.

**Table 4. Models of Language, Everyday, Movement and Social Skills**

Dependent Variable	$Q_i^{talk}$	$Q_i^{talk}$	$Q_i^{eskills}$	$Q_i^{eskills}$	$Q_i^{move}$	$Q_i^{move}$	$Q_i^{social}$	$Q_i^{social}$
B Singing	0.410*** (0.103)	0.321*** (0.109)	-0.023 (0.090)	-0.041 (0.100)	0.215** (0.095)	0.219** (0.100)	0.324*** (0.097)	0.241** (0.101)
B Going for Walks	-0.099 (0.174)	-0.109 (0.184)	-0.040 (0.151)	0.008 (0.154)	-0.320** (0.149)	-0.273* (0.152)	-0.204 (0.181)	-0.146 (0.187)
B Painting	-0.010 (0.097)	0.008 (0.100)	0.068 (0.083)	0.120 (0.088)	0.347*** (0.081)	0.391*** (0.084)	0.025 (0.093)	0.039 (0.097)
B Reading	0.629*** (0.120)	0.539*** (0.125)	0.074 (0.113)	0.092 (0.125)	0.096 (0.124)	0.018 (0.134)	0.245* (0.129)	0.201 (0.137)
B Picture books	0.227 (0.236)	0.193 (0.263)	-0.023 (0.186)	0.071 (0.217)	0.014 (0.227)	0.048 (0.246)	0.150 (0.222)	0.065 (0.253)
B Playground	-0.134 (0.087)	-0.112 (0.095)	0.196** (0.079)	0.149* (0.083)	0.005 (0.079)	-0.020 (0.085)	-0.004 (0.085)	-0.003 (0.091)
B Visiting	0.111 (0.093)	0.177* (0.099)	0.192** (0.080)	0.195** (0.085)	0.087 (0.086)	0.122 (0.090)	0.271*** (0.090)	0.329*** (0.097)
B Shopping	-0.030 (0.085)	0.072 (0.092)	0.083 (0.075)	0.167** (0.081)	-0.059 (0.077)	-0.032 (0.083)	-0.087 (0.082)	0.010 (0.087)
B TV	-0.077 (0.086)	-0.073 (0.096)	0.042 (0.076)	-0.056 (0.085)	-0.040 (0.078)	-0.047 (0.083)	0.032 (0.082)	0.058 (0.090)
HH Equiv Income		0.021 (0.050)		-0.092* (0.050)		0.060 (0.041)		0.111** (0.053)
East Germany		0.106 (0.124)		0.407*** (0.106)		0.013 (0.103)		-0.000 (0.113)
Mother's age		-0.001 (0.009)		-0.027*** (0.009)		-0.025*** (0.009)		-0.010 (0.009)
Mother's educ		0.063*** (0.021)		0.002 (0.017)		0.027 (0.017)		0.011 (0.019)
Mother not working		-0.131 (0.102)		-0.207** (0.091)		-0.124 (0.092)		-0.205** (0.096)
G'parent hours		0.013** (0.006)		-0.006 (0.004)		0.000 (0.005)		0.010* (0.006)
Daycare hours		-0.001 (0.004)		0.005* (0.003)		-0.000 (0.003)		0.011*** (0.003)
Num siblings		0.012 (0.045)		0.107** (0.046)		0.144*** (0.041)		0.087** (0.044)
TV disallowed		-0.029 (0.059)		-0.007 (0.055)		-0.078 (0.052)		-0.010 (0.056)
Controls for migrant, single parent and health	No	Yes	No	Yes	No	Yes	No	Yes
Controls for child sex, age and health	Yes for all models							
Year dummies	Yes for all models							
n	799	742	808	749	804	745	810	751
Pseudo R-Sq	0.0699	0.0919	0.0455	0.0744	0.0541	0.0673	0.0445	0.0661
AIC	1812.39	1665.155	2741.262	2489.946	2231.679	2062.51	2037.749	1856.452
BIC	1906.057	1812.655	2835.154	2637.746	2325.471	2210.138	2131.69	2004.337
Linktest	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes: 1. Here and throughout the remainder of the paper, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively, and all standard errors are White adjusted for heteroscedasticity; 2. Unless otherwise stated, data in the paper relate to the years 2007-2010; 3. Controls for migrant, single parent and health are generally not significant and many coefficients associated with child characteristics are significant.



Our attention now turns to the effects of resources on child capabilities. Having an older mother is negatively associated with all four capabilities and the effect is statistically significant, at the 1% level, in the case of everyday skills and movement skills. Conversely, and not surprisingly, having a mother with more years of education has a positive impact on all four capability domains. The effect is only statistically significant, however, in the case of talking skills, where it is significant at the 1% level. *Ceteris paribus*, children whose mothers are not working have lower capabilities in all four domains. This effect is statistically significant at the 5% level in both the everyday skills and the social skills arenas. Spending more hours being cared for by grandparents is associated, at the 5% significance level and 10% level respectively, with better talking skills and social skills. Spending more time in nurseries is also associated, at the 1% significance level, with better social skills and, at the 10% level, with better everyday skills.

Other things being equal, children with more siblings have better skills in all four domains, perhaps suggesting that they are learning from older siblings. This effect is statistically significant at the 1% level for movement skills, and at the 5% level for everyday skills and social skills. We noted earlier that siblings have a negative impact on time spent engaging in activities with parents, but this finding suggests that a trade-off between ‘quantity’ and ‘quality’ in parental investment may not be so stark, as very young children’s learning might also benefit from interacting with siblings.

We also find that children in East Germany are found to have, *ceteris paribus*, better everyday skills. This effect, statistically significant at the 1% level, may reflect historical differences between the two areas of Germany prior to reunification. The effect of household affluence, captured by ‘HH Equiv Income,’ on the four domains is also worthy of note. It is found to have a positive impact, significant at the 5% level, on social skills but a marginally significant negative impact on everyday skills. In short, it seems that the social resources to which a child has access play a vital role in skill development, and that the strength of the relationship depends on both on the skill involved and the social relations of those interacting with the child.

#### **4.3.1 Robustness**

One possible concern with some of the results above is that the functionings variables could be endogenous due to reverse causality; parents may choose activities

partly because of their child's capabilities.<sup>27</sup> To address this concern via instrumentation, where several activities were significantly associated with a particular type of capability, we created composite indices of activity of the 'frequency of the most significant activities,' since, not surprisingly, simultaneously instrumenting for several different activity variables proved unfeasible. This was conducted by extending the 'counting plus threshold' approach applied to our capability variables in Section 3 to the functionings variables. To take one example, for talking skills a composite activities variable (SRV) was created, based simply on the sum of the binary versions of our variables for singing, reading and visiting families. We then, in each case, estimated models in which the composite indices were included and conducted Wu-Hausman tests. In all four models of Table 5, it is not possible, using this approach, to reject a null hypothesis of exogeneity.

A further concern, discussed above in relation to estimation of (1) and (2), is the effect that the mother's reporting style might have on the results, since both dependent and independent variables are self-reported. Including the respondents' own reported happiness levels as an additional explanatory variable, proxying for reporting style, yields very similar results to those in Table 4, as does including instead the residual from a regression of mother's happiness as an extra covariate: these results are reported in Appendix D. Finally, we note that there is also evidence of a significant relationship between the SRV composite index and a specific capability question about the child's ability to complete sentences, both in OLS and 2SLS models: these results are reported in appendix F.

---

<sup>27</sup> A similar issue occurs where the capability indicator is closely related, by definition, to engagement in the activity. For example, the movement skills index has a component 'm3- Climbs up playground climbing equipment and other high playground structures.' Achievement of this skill, by definition, necessitates trips to the playground. Similarly, the movement skills index contains a component 'm4- Cuts paper with scissors,' which by definition necessitates some involvement in arts and crafts.

**Table 5 Testing for endogeneity - 2SLS models of capabilities**

	$Q_i^{talk}$	$Q_i^{eskills}$	$Q_i^{move}$	$Q_i^{social}$
Child's age	0.061*** (0.009)	0.120*** (0.015)	0.072*** (0.013)	0.048*** (0.010)
Male child	-0.048 (0.076)	-0.592*** (0.100)	-0.280 (0.203)	-0.238*** (0.090)
Hospital days in past 12 mths	-0.042*** (0.012)	-0.023 (0.017)	-0.028** (0.014)	-0.023* (0.013)
Mother's education	0.063*** (0.019)	0.007 (0.024)	0.042* (0.025)	0.016 (0.019)
Mother not working	-0.152* (0.080)	-0.230* (0.127)	-0.104 (0.093)	-0.165* (0.087)
Single parent	0.072 (0.090)	-0.085 (0.124)	-0.107 (0.136)	-0.018 (0.100)
G'parent hours	0.010** (0.005)	-0.008 (0.006)	-0.004 (0.006)	0.008 (0.005)
Daycare hours	0.001 (0.003)	0.005 (0.004)	0.000 (0.003)	0.010*** (0.003)
HH Equiv Income	0.027 (0.043)	-0.100* (0.056)	0.094 (0.061)	0.080* (0.044)
East Germany		0.538*** (0.139)	0.011 (0.114)	0.008 (0.104)
Mother's age		-0.034*** (0.011)	-0.017* (0.010)	-0.007 (0.008)
Number of siblings		0.110** (0.056)	0.065 (0.080)	0.042 (0.055)
Activities (SRV)	0.048 (0.101)			
Activities (PVS)		0.076 (0.228)		
Activities (PS)			-0.216 (0.349)	
Activities (VS)				0.023 (0.214)
Year dummies included	Yes	Yes	Yes	Yes
Constant	0.908 (0.864)	-0.913 (1.754)	2.469 (2.111)	2.240 (1.190)
n	743	742	738	744
First Stage Regression	F(2,728)=17.6251	F(1,725)= 13.9336	F(1,721)= 5.3592	F(1,727)= 15.3969
Wu-Hausman Test	F(1,728)=0.865 (p=0.353)	F(1,724)= 0.042 (p=0.838)	F(1,720)= 1.115 (p= 0.292)	F(1,726)= 0.294 (p= 0.588)
Sargan Score	Chi= 0.148 (p = 0.701)	N/A	N/A	N/A

Notes: (i) Activities SRV = sing + read + visit. 'Activities SRV' variable instrumented using 'number of siblings' and 'child not allowed to watch TV alone.' (ii)Activities (PVS) = play + visit + shop. 'Activities PVS' variable instrumented using and 'child not allowed to watch TV alone.' (iii) Activities (PS) = paint + sing. 'Activities PS' variable instrumented and 'child not allowed to watch TV alone.' (iv) Activities VS = visit + sing. 'Activities PS' variables

## 5. Discussion

The welfare and happiness of economic dependents has historically been given relatively little attention in economics, yet it should arguably be a central stage of the economics of wellbeing. At such an early age, household income is a poorer proxy than it is for working age adults and given that a significant proportion of our

lives involve dependency, it is reasonable to ask what promotes wellbeing and happiness during these periods. Substantively, this paper finds that material affluence is only one of a number of factors important for the development of very young children. More interactive activities between child and carer appear related to the development of both cognitive and non-cognitive capacities - and to child happiness. The finding is plausible and suggests that active parenting plays an important role in child development. Indeed work by Cunha and Heckman (2009) indicates that whilst remedial work to develop many skills and abilities later is possible, it is also relatively expensive, suggesting that the highest payoffs are likely to derive from the activities studied here - and possibly even earlier, starting from birth.<sup>28</sup>

Whilst our primary focus has been on the parenting regime, we also found interesting evidence that although sibling competition may reduce time spent in parent-child interactions, siblings do also help to significantly accelerate capability formation in three out of the four areas studied. Barr and Hayne (2003) found, for example, in a parental diary study of 12- 15- and 18- month old children, that they acquired one or two new behaviours a day via imitation, and that those with siblings were more liable to copy without explicit instructions to do so. More recent work (for example Over and Carpenter (2012)) has highlighted the importance of identification with the source or model from which the child is copying, and it may be that children find it easier to identify with their siblings than with their parents, who are after all generally much more similar to themselves in many ways. Nielsen (2006) also finds that acting socially rather than aloof elicits greater levels of copying, and it is quite possible that siblings tend to act more socially when they interact with each other.

That said, there are many interesting questions related to causality which cannot readily be addressed with these data. We know from the significance of personal characteristics in the activities regressions that age and sex can play a role but not generally why this so. In the case of sex, it would be interesting to investigate whether the child's gender matters because sex determines the activities children like, or whether parents decide to invest differently in the development of children of different sexes, as Barcellos et al. (2012) suggest. Furthermore, in some cases, the

---

<sup>28</sup> The theme is fast becoming a leitmotiv in the literature. Chevalier and Marie (2015) for example conclude that there is a need for very early stage interventions whilst noting the identification of children at risk is difficult given that parenting style is rarely observed. However, given the data analysed here, we would be more optimistic that indicators of parenting style, whilst not perfect, could usefully be developed for use in clinical settings, to the benefit of parents and child professionals alike.

activity in which the child is involved, and the capability that the parent has been asked to identify, sound somewhat similar, so there may be issues of definitional connection. Perhaps there is a certain amount of inevitability in this when testing for the impact of cognate activity involvement, though our models of sentence completion seem to provide an example of where a rather precisely defined aspect of capability is plausibly connected to joint activities with the parent in a non-definitional manner. In any case, we believe the paper helps to highlight the importance, more generally, of cultural competencies for human welfare. In the UK, arts policy currently emphasises financial contributions to the economy but our evidence could be taken to argue that a variety of arts related activities also have an important role to play in the early stages of human development – particularly those related to cognition.<sup>29</sup> Furthermore, the results point to the potential value of thinking not just in terms of a general home learning environment, as educational psychologists currently emphasise, but also about the specific kinds of activities that parents and carers need to engage in, if they want to promote the acquisition of particular skills. In this regard, our findings echo those of Del Bono et al. (2014) who show that non-cognitive skills do not respond to disciplinary parenting regimes in the way that cognitive skills do. Doyle et al. (2015) likewise find, in a randomized controlled trial of a community visiting programme aimed at parenting from birth, that only cognitive development scores were responsive to intervention, so it could also be that measures of social inputs and activities to promote social skills merit more emphasis.

We also suggest that this explicit application of the capability approach helps to make two points about welfare economics itself. Firstly, because Sen’s framework focuses on capabilities, happiness and activities as the main outcomes of life quality, it can, in principle, be applied right across the life course. The current application, which focuses on the production of various aspects of life quality in a non-standard age-group for conventional economic analysis, helps to highlight the potential empirical reach and applicability of this theoretical setup. It thus provides welfare economics with an intuitively appealing way of engaging with ‘wellbeing,’ without having to focus on the consumption of marketed goods – which we believe is often warranted and sometimes essential for policy analysis purposes. Secondly, our models

---

<sup>29</sup> Similar results have been found for Italy by Addabbo et al. (2014).

suggest the approach's value as a complement to others in economics, where income or preference is the focus of analysis. If development and happiness are key objectives for parents and children in their early years, it may be premature to focus too much on the yet to be fully formed preferences of the child. In addition, one can imagine that the social resources parents provide for children, such as warmth, structure and engagement, may have only a weak relationship to income and wealth. It has often been argued that there are relatively few situations where welfare is affected by activities for which markets are absent and that, as a result, income is a good proxy for wellbeing. However, if welfare depends on how time is spent, rather than consumption, then reliance only on correlations with income is less persuasive, either for explanatory or predictive purposes. Thirdly, and finally, in focussing on the equations for the production of wellbeing, our approach demonstrates the *behavioural* value of Sen's theory, which is sometimes masked by the ethical and philosophical discussions that have surrounded discussion of the approach since the 1990s. This discursive debate has been hugely influential but it hides the existence of the formal theoretical framework developed to address foundational problems in social choice and its capacity to structure empirical work. Human flourishing for very young children not only includes their happiness, as utilitarians would allow, but fundamentally their development to fulfil their potential. Most utilitarians would not disagree with this and the capability framework provides a natural architecture for engaging with this aspect of human wellbeing, something that would be cumbersome at best, if attempted through more traditional approaches. Our analysis serves, therefore, as a bridge between normative and behavioural economics traditions – a need highlighted by McQuillin and Sugden (2012).

We conclude that our analysis demonstrates concretely that the formal version of capability based welfare economics is not only very general, being directly and widely applicable, but also apt from a behavioural perspective. It has, therefore, the potential to sustain a new approach to welfare economics that could add many complementary insights to those based on traditional utilitarian frameworks.

## References

- Addabbo, T., and Di Tommaso, M.L.. (2011), “Children's Capabilities and Family Characteristics in Italy: Measuring Imagination and Play,” *Children and the capability approach*, 222–244, in Ballet, J. Biggeri, M and Comim, F (ed), *Children and the Capability Approach*, New York, Palgrave Macmillan.
- Addabbo, T, Di Tommaso ML and Maccagnan A. (2014), “Gender differences in Italian children’s capabilities,” *Feminist Economics*, 20, 90–121.
- Aizer, A. and Cunha, F. (2012), “The Production of Child Human Capital: Endowments, Investments and Fertility,” NBER Working Paper No. 18429.
- Alkire, S. and Foster, J. (2011), “Counting and Multidimensional Poverty Measurement,” *Journal of Public Economics*, 95, 476–487.
- Anand, P. Santos, C and Smith R, (2009) The measurement of capabilities ch 16 in *Arguments for a Better World*, Festschrift for Amartya Sen, Basu, K and Kanbur, R, Oxford, Oxford University Press.
- Anand, P. & Krishnakumar, J & Tran, N B, (2011), “Measuring welfare: Latent variable models for happiness and capabilities in the presence of unobservable heterogeneity,” *Journal of Public Economics*, 95, 205–215.
- Anand, P., Gray, A., Liberini, F., Roope, L., Smith, R. and Thomas, R. (2015), “Wellbeing Over 50,” *The Journal of the Economics of Ageing*, 6, 68–78.
- Barcellos, S. H., Carvalho, L., & Lleras-Muney, A. (2012), “Child Gender and Parental Investments in India: Are Boys and Girls Treated Differently?” (No. w17781). National Bureau of Economic Research.
- Barr, R. and Hayne, H., 2003. “It’s not what you know, it's who you know: Older siblings facilitate imitation during infancy,” *International Journal of Early Years Education*, 11, 7–21.
- Becker, G., Lewis, H. (1973) "On the Interaction Between the Quantity and Quality of Children". *Journal of Political Economy*, vol. 81(2), pp.S279–88.
- Bertoni, M. (2015), “Hungry today, unhappy tomorrow? Childhood hunger and subjective wellbeing later in life,” *Journal of Health Economics*, 40, 40–53.
- Biggeri, M., Ballet, J. and Comin, F. (2010), “The Capability Approach and research on Children,” pp. 75-89 in *Children’s Wellbeing vol 4*, ed S. Andresen et al., Springer.
- Biggeri, M, Libanora, R, Mariani S. and Menchini, L. (2006), “Children conceptualising their capabilities: Results of a the survey during the first children’s world congress on child labour,” *Journal of Human Development*, 7, 59–83.

- Carneiro, P., Meghir, C. and Parys, M. (2013), “Maternal Education, Home Environments, and the Development of Children and Adolescents,” *Journal of the European Economic Association*, 11, Issue Supplement s1, 123–160.
- Chevalier, A., & Marie, O. (2015). *Economic Uncertainty, Parental Selection, and Children's Educational Outcomes*, The Lifecourse Centre Australia, Paper No. 201506.
- Conti, G., & Heckman, J. J. (2014), *Economics of child well-being* (pp. 363–401). Springer Netherlands.
- Cunha, F. and Heckman, 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. (2009), “Investing in our Young People,” *Rivista Internazionale di Scienze Sociali*, 387–417.
- Cunha, F., Heckman, J. and Schennach, S. (2010), “Estimating the technology of cognitive and noncognitive skill formation,” *Econometrica* 78, 883–931.
- Del Bono, E., Francesconi, M. Kelly, Y. Sacker, A (2014), “Early Maternal Time Investment and Early Child Outcomes,” IZA Discussion Papers, No. 8608
- Di Tommaso, M.L. (2007), “Children capabilities: A structural equation model for India,” *The Journal of Socio-Economics*, 36, 436–450.
- Diener, E., Lucas, R., Schimmack, U. and Helliwell, J. (2009), *Well-Being for Public Policy*. New York: Oxford University Press.
- Doyle, O., Harmon, C., Heckman, J., Logue, C., and Moon, S. (2015), “Early skill formation and the efficiency of parental investment: a randomized controlled trial of home visiting,” Lifecourse Centre Discussion Paper, Australia.
- Duflo, E. (2012), “Human values and the design of the fight against poverty,” Tanner Lectures, May 2012.
- Fleurbaey, M (2008), *Fairness responsibility and welfare*, Oxford, Oxford University Press.
- Frey, B.S. and Stutzer A. (2012), “The Use of Happiness Research for Public Policy,” *Social Choice and Welfare*, 38, 659–674.
- Frijters, P., Haisken-DeNew, J.P. and Shields, M.A. (2004), “Money does matter! Evidence from increasing real income and life satisfaction in East Germany following reunification,” *The American Economic Review*, 94, 730–740.
- Green, C.M., Berkule, S.B., Dreyer, B.P., Fierman, A.H., Huberman, H.S., Klass, P.E., Tomopoulos, S., Yin, H.S., Morrow, L.M. and Mendelsohn, A.L. (2009), “Maternal literacy and associations between education and the cognitive home



- environment in low-income families,” *Archives of pediatrics & adolescent medicine*, 163, 832–837.
- Heckman, J. (2006), “Skill Formation and the Economics of Investing in Disadvantaged Children,” *Science*, 312, 1900–1902.
- Kahneman, D., Wakker, P. and Sarin, R. (1997), “Back to Bentham? Explorations of experienced utility,” *The Quarterly Journal of Economics*, 2, 375–405.
- Luthar, S. (2003), “The Culture of Affluence: Psychological Costs of Material Wealth,” *Child Development*, 74, 1581–1593.
- MacDonald, K. and Parke, R. (1984), “Bridging the Gap: Parent-Child Play Interaction and Peer Interactive Competence,” *Child Development*, 55, 1265–1277.
- McQuillin, B. and Sugden, R. (2012), “Reconciling normative and behavioural economics,” *Social Choice and Welfare*, 38, 553–567.
- Nielsen, M., 2006. “Copying actions and copying outcomes: social learning through the second year,” *Developmental Psychology*, 42, p.555–565.
- Over, H. and Carpenter, M., 2012. “Putting the social into social learning: explaining both selectivity and fidelity in children’s copying behaviour,” *Journal of Comparative Psychology*, 126, p.182–192.
- Phipps, S. (2002), “The Well-being of Young Canadian Children International Perspective: A Functionings Approach,” *Review of Income and Wealth*, 48, 493–515.
- Pregibon, D. (1979), “Data analytic methods for generalized linear models,” PhD dissertation, University of Toronto.
- Puppe, C. (1995), “Freedom of choice and rational decisions”, *Social Choice and Welfare*, 12, 137–153.
- Schokkaert, E. (1999), “M. Tout-le-monde est “post-welfariste.” Opinions sur la justice redistributive,” *Revue Economique*, 50, 811–831.
- Sen, A. (1979), “Personal Utilities and Public Judgements: Or What's Wrong With Welfare Economics,” *The Economic Journal*, 89, 537–558.
- Sen, A. (1985), *Commodities and Capabilities*, Amsterdam, North-Holland.
- Sen, A. (1985b), “Well-Being, Agency and Freedom: The Dewey Lectures 1984,” *The Journal of Philosophy* 82, 169–221.
- Tukey, J. W. (1949), “One degree of freedom for non-additivity,” *Biometrics*, 5, 232–242.

- Volkert, J. and Wüst, K. (2011), “Early Childhood, Agency and Capability Deprivation - A Quantitative Analysis Using German Socio-Economic Panel Data”. In: *Closing the Capabilities Gap. Renegotiating Social Justice for the Young: Barbara Budrich Esser*, pp. 179–198.
- White, M. and Dolan, P. (2009), “Accounting for the Richness of Daily Activities,” *Psychological Science*, 20, 1000–1008.
- Whitehurst, G. and Lonigan, C. (1998), “Child Development and Emergent Literacy,” *Child Development*, 69, 848–872.

## Supplementary Materials

### Appendix A. Questions from German Socio-Economic Panel “Your Child at the Age of 2-3 Years” component

#### 1. Child happiness (4 point measure)

*Do what extent do you agree with the following statement: “My child is usually happy and content.” (Agree completely, Agree slightly, Disagree Slightly, Disagree completely)*

#### 2. Functionings/Activities (4 point and binary measures)

*How many times in the last 14 days have you or the main caregiver done the following activities together with your child? (Daily, Several times per week, At least once a week, Never)*

- Singing children’s songs with or to the child*
- Taking walks outdoors*
- Painting or doing arts and crafts*
- Reading or telling stories*
- Looking at picture books*
- Going to the playground*
- Visiting other families with children*
- Going shopping with the child*
- Watching television or videos with the child*

#### 3. Parenting Resources

TV disallowed (3 point measure)

*Is your child allowed to watch television or videos alone, without adult supervision? (yes, rarely as an exception or no, never)*

#### G’parent hours and Daycare hours

*If you think about a normal week, are there any other people than you who take care of your child? If so, who are they, and how many hours per week are they responsible for childcare? (Respondent is then presented with a number of options to choose from and is prompted to fill in a box labelled ‘hours’)*

#### 4. Child Characteristics

Days in Hosp *Did your child experience health problems in the last 12 months that necessitated a hospital stay? (If yes, respondent is asked to input the number of days)*

#### 5. Capability sub-dimensions

*For parents, it is always a big event when their child learns something new. Please tell us what those new things in the case of your child.*

*Talking (Yes, To some extent or No)*

- t1 Understands brief instructions such as “go get your shoes”*
- t2 Forms sentences with at least two words*
- t3 Speaks in full sentences (with four or more words)*

- t4 Listens attentively to a story for five minutes or longer*
- t5 Passes on simple messages such as “dinner is ready”*

*Everyday skills (Yes, To some extent or No)*

- e1 Uses a spoon to eat, without assistance and without dripping*
- e2 Blows his/her nose without assistance*
- e3 Uses the toilet to do ‘number two’*
- e4 Puts on pants and underpants the right way around*
- e5 Brushes his/her teeth without assistance*

*Movement (Yes, To some extent or No)*

- m1 Walks forwards down the stairs*
- m2 Opens doors with the door handle*
- m3 Climbs up playground climbing equipment and other high playground structures*
- m4 Cuts paper with scissors*
- m5 Paints/draws recognizable shapes on paper*

*Social (Yes, To some extent or No)*

- s1 Calls familiar people by name; for example, says “mommy” and “daddy” or uses the father’s first name*
- s2 Participates in games with other children*
- s3 Get’s involved in role-playing games (‘playing pretend’)*
- s4 Shows a special liking for particular playmates or friends*
- s5 Call his/her own feelings by name, eg “sad”, “happy”, “scared”*

## Appendix B. Further Descriptive Statistics.

Table B1. Happiness

	Applies Fully	Applies More	Applies Less	Not at all	Missing	Total
Child Happiness	608	200	4	2	1	815

Table B2. Activities

	Daily	Several Times a Week	At least once per week	Not at all	Total
Singing	429	215	122	49	815
Walking	516	251	45	3	815
Painting	218	328	222	47	815
Reading	522	178	85	30	815
Picture books	591	190	26	8	815
Playing	119	313	275	108	815
Visiting	32	220	441	122	815
Shopping	77	343	363	32	815
TV	218	259	184	154	815

Table B3. Raw Capability Scores

Capability	Yes	Partly or No	Missing	Total
t1 Understands...	789	25	1	815
t2 Forms...	766	46	3	815
t3 Speaks...	597	215	3	815
t4 Listens...	565	249	1	815
t5 Relates...	723	91	1	815
e1 Eats...	521	290	4	815
e2 Blows...	374	440	1	815
e3 Uses...	385	429	1	815
e4 Puts...	284	529	2	815
e5 Brushes...	386	428	1	815
m1 Walks...	766	47	2	815
m2 Uses...	786	28	1	815
m3 Climbs...	630	183	2	815
m4 Uses Scissors...	468	342	5	815
m5 Paints...	276	535	4	815
s1 Calls...	801	12	2	815
s2 Plays...	725	89	1	815
s3 Participates...	561	253	1	815
s4 Shows...	608	206	1	815
s5 Calls feelings...	625	187	3	815

Table B4. Summary Capability Measures

	0	1	2	3	4	5	Missing	Total
$Q_i^{talk}$	6	16	53	81	208	446	5	815
$Q_i^{skills}$	92	155	199	155	120	89	5	815
$Q_i^{move}$	5	23	98	213	290	177	9	815
$Q_i^{social}$	4	12	60	148	202	386	3	815

## Appendix C. Models of Activities including Mother's Happiness

**Table C1(a) Activities as Functions of Financial and Parenting Resources including Mother's Happiness**

	Sing	Walk	Paint	Read	Pictbks	Play	Visit	Shop	TV
HH Equiv Income	0.086 (0.057)	-0.045 (0.051)	0.097** (0.046)	0.109* (0.064)	0.058 (0.063)	0.065 (0.047)	0.006 (0.055)	-0.069* (0.040)	-0.082* (0.045)
East Germany	0.023 (0.122)	0.198 (0.124)	0.113 (0.107)	-0.357*** (0.119)	-0.104 (0.129)	0.079 (0.111)	-0.141 (0.112)	-0.113 (0.104)	0.259** (0.109)
Mother Immigrant	-0.272 (0.166)	0.212 (0.176)	0.057 (0.145)	-0.461*** (0.160)	-0.096 (0.191)	0.645*** (0.155)	0.336** (0.169)	0.276* (0.160)	0.124 (0.147)
Mother's age	0.017* (0.009)	0.006 (0.009)	0.000 (0.009)	0.007 (0.010)	0.025*** (0.010)	-0.015* (0.008)	-0.006 (0.009)	0.013 (0.008)	0.008 (0.009)
Mother's education	0.052*** (0.018)	-0.018 (0.018)	-0.004 (0.016)	0.094*** (0.020)	0.069*** (0.022)	-0.038** (0.017)	-0.012 (0.016)	-0.038** (0.017)	-0.073*** (0.017)
Mother not working	-0.078 (0.096)	0.180* (0.104)	0.132 (0.095)	-0.002 (0.103)	0.184 (0.113)	0.056 (0.089)	0.251*** (0.093)	0.022 (0.093)	-0.059 (0.095)
Mother's health	-0.045 (0.057)	0.055 (0.060)	0.034 (0.054)	0.114** (0.056)	0.031 (0.064)	0.004 (0.050)	0.035 (0.054)	-0.040 (0.053)	0.031 (0.055)
Single parent	-0.162 (0.105)	-0.030 (0.115)	-0.078 (0.100)	-0.036 (0.110)	0.009 (0.119)	0.025 (0.101)	0.031 (0.102)	-0.055 (0.102)	0.158 (0.100)
G' parent hours	-0.011* (0.006)	-0.000 (0.006)	0.001 (0.005)	-0.002 (0.006)	0.001 (0.006)	-0.002 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.006 (0.005)
Daycare hours	0.005 (0.004)	-0.007* (0.004)	-0.003 (0.003)	0.002 (0.004)	-0.002 (0.004)	0.002 (0.003)	0.001 (0.003)	-0.014*** (0.003)	-0.003 (0.003)
Num siblings	-0.110** (0.053)	-0.101** (0.047)	-0.103** (0.047)	-0.120*** (0.045)	-0.192*** (0.051)	-0.001 (0.043)	-0.113** (0.047)	-0.047 (0.044)	-0.124*** (0.044)
TV disallowed	0.145** (0.058)	0.087 (0.060)	0.038 (0.055)	0.111* (0.058)	0.067 (0.063)	0.142** (0.056)	0.157*** (0.055)	0.095* (0.057)	-0.359*** (0.054)
Mother's happiness	0.095*** (0.030)	0.084*** (0.032)	0.063** (0.030)	0.117*** (0.031)	0.127*** (0.034)	0.041 (0.027)	0.024 (0.030)	-0.010 (0.028)	-0.023 (0.029)
Controls for Child Sex, Age and Health	Yes in all models								
Year dummies	Yes in all models								
N	747	747	747	747	747	747	747	747	747
Pseudo R-Sq	0.0741	0.0364	0.0258	0.0932	0.0773	0.0303	0.0321	0.0433	0.0573
AIC	1610.299	1259.671	1844.324	1360.17	1022.789	1907.868	1630.675	1589.405	1969.796
BIC	1711.852	1361.225	1945.878	1461.723	1124.342	2009.421	1732.228	1690.958	2071.349
Linktest	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes: (i) Ordered probit model results reported; (ii) Here and in subsequent tables, HH Equiv Income is expressed in tens of thousands of Euros.

**Table C1(b) Activities as Functions of Financial and Parenting Resources including FE of Mother's Happiness**

	Sing	Walk	Paint	Read	Pictbks	Play	Visit	Shop	TV
HH Equiv Income	0.095* (0.057)	-0.039 (0.052)	0.109** (0.047)	0.121* (0.065)	0.070 (0.063)	0.074 (0.047)	-0.000 (0.054)	-0.074* (0.040)	-0.088* (0.046)
East Germany	-0.009 (0.121)	0.169 (0.124)	0.093 (0.107)	-0.396*** (0.118)	-0.146 (0.129)	0.066 (0.111)	-0.152 (0.112)	-0.111 (0.104)	0.266** (0.109)
Mother Immigrant	-0.238 (0.166)	0.245 (0.177)	0.079 (0.145)	-0.418*** (0.160)	-0.049 (0.190)	0.658*** (0.155)	0.348** (0.169)	0.273* (0.160)	0.117 (0.146)
Mother's age	0.017* (0.009)	0.006 (0.009)	0.001 (0.009)	0.007 (0.010)	0.026*** (0.010)	-0.015* (0.008)	-0.006 (0.009)	0.013 (0.008)	0.008 (0.009)
Mother's education	0.056*** (0.018)	-0.014 (0.018)	-0.003 (0.016)	0.099*** (0.020)	0.074*** (0.022)	-0.037** (0.017)	-0.009 (0.016)	-0.037** (0.017)	-0.073*** (0.017)
Mother not working	-0.089 (0.096)	0.172* (0.104)	0.125 (0.095)	-0.016 (0.103)	0.169 (0.113)	0.051 (0.089)	0.250*** (0.093)	0.023 (0.093)	-0.056 (0.095)
Mother's health	0.017 (0.055)	0.108* (0.055)	0.077 (0.051)	0.190*** (0.052)	0.114* (0.059)	0.032 (0.047)	0.047 (0.052)	-0.049 (0.051)	0.014 (0.051)
Single parent	-0.198* (0.105)	-0.062 (0.116)	-0.101 (0.100)	-0.080 (0.109)	-0.039 (0.119)	0.011 (0.100)	0.021 (0.101)	-0.052 (0.102)	0.166* (0.100)
G'parent hours	-0.010* (0.006)	0.000 (0.006)	0.001 (0.005)	-0.001 (0.006)	0.002 (0.006)	-0.002 (0.005)	0.005 (0.005)	0.005 (0.005)	-0.006 (0.005)
Daycare hours	0.005 (0.004)	-0.007* (0.004)	-0.003 (0.003)	0.003 (0.004)	-0.001 (0.004)	0.002 (0.003)	0.001 (0.003)	-0.014*** (0.003)	-0.003 (0.003)
Num siblings	-0.114** (0.053)	-0.105** (0.047)	-0.105** (0.047)	-0.125*** (0.044)	-0.198*** (0.051)	-0.002 (0.043)	-0.115** (0.047)	-0.048 (0.044)	-0.123*** (0.044)
TV disallowed	0.146** (0.058)	0.088 (0.060)	0.039 (0.055)	0.112* (0.058)	0.068 (0.063)	0.141** (0.056)	0.159*** (0.056)	0.095* (0.057)	-0.359*** (0.054)
FE of mother's happiness	0.095*** (0.030)	0.084*** (0.032)	0.061** (0.030)	0.116*** (0.031)	0.128*** (0.034)	0.042 (0.027)	0.027 (0.030)	-0.006 (0.029)	-0.022 (0.029)
Controls for Child Sex, Age and Health	Yes in all models								
Year dummies	Yes in all models								
N	746	746	746	746	746	746	746	746	746
Pseudo R-Sq	0.0735	0.0365	0.0257	0.0927	0.0772	0.0304	0.0327	0.0433	0.0573
AIC	1610.052	1258.586	1842.64	1360.136	1022.341	1905.552	1627.161	1587.828	1967.599
BIC	1711.576	1360.11	1944.164	1461.66	1123.865	2007.076	1728.685	1689.352	2069.123
Linktest	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes: (i) Ordered probit model results reported; (ii) Here and in subsequent tables, HH Equiv Income is expressed in tens of thousands of Euros.

## Appendix D. Models of Capabilities including Mother's Happiness

**Table D1. Models of Language, Everyday, Movement and Social Skills**

Dependent Variable	$Q_i^{talk}$	$Q_i^{talk}$	$Q_i^{skills}$	$Q_i^{skills}$	$Q_i^{move}$	$Q_i^{move}$	$Q_i^{social}$	$Q_i^{social}$
B Singing	0.274** (0.110)	0.274** (0.110)	-0.040 (0.103)	-0.040 (0.103)	0.200** (0.101)	0.200** (0.101)	0.192* (0.102)	0.193* (0.102)
B Going for Walks	-0.103 (0.185)	-0.104 (0.185)	0.002 (0.153)	0.002 (0.153)	-0.273* (0.152)	-0.272* (0.152)	-0.160 (0.185)	-0.159 (0.186)
B Painting	0.008 (0.100)	0.007 (0.100)	0.114 (0.088)	0.114 (0.088)	0.394*** (0.085)	0.395*** (0.085)	0.031 (0.097)	0.031 (0.097)
B Reading	0.546*** (0.126)	0.546*** (0.126)	0.068 (0.125)	0.069 (0.125)	0.014 (0.133)	0.015 (0.133)	0.190 (0.136)	0.191 (0.136)
B Picture books	0.191 (0.260)	0.191 (0.260)	0.061 (0.214)	0.060 (0.213)	0.046 (0.243)	0.045 (0.243)	0.065 (0.247)	0.064 (0.247)
B Playground	-0.107 (0.096)	-0.104 (0.096)	0.149* (0.083)	0.149* (0.084)	-0.023 (0.086)	-0.025 (0.086)	0.004 (0.092)	0.005 (0.092)
B Visiting	0.211** (0.100)	0.207** (0.100)	0.189** (0.085)	0.189** (0.085)	0.128 (0.091)	0.130 (0.091)	0.360*** (0.099)	0.357*** (0.099)
B Shopping	0.077 (0.093)	0.075 (0.093)	0.176** (0.081)	0.175** (0.081)	-0.032 (0.084)	-0.032 (0.084)	0.007 (0.088)	0.004 (0.088)
B TV	-0.059 (0.097)	-0.062 (0.097)	-0.052 (0.086)	-0.052 (0.086)	-0.043 (0.084)	-0.042 (0.084)	0.075 (0.090)	0.072 (0.090)
HH Equiv Income	0.013 (0.050)	0.015 (0.050)	-0.097* (0.050)	-0.090* (0.051)	0.064 (0.042)	0.070 (0.043)	0.101* (0.053)	0.107** (0.053)
East Germany	0.131 (0.126)	0.113 (0.126)	0.422*** (0.107)	0.404*** (0.106)	0.026 (0.104)	0.016 (0.103)	0.029 (0.114)	0.004 (0.114)
Mother's age	0.001 (0.009)	0.001 (0.009)	-0.026*** (0.009)	-0.026*** (0.009)	-0.025*** (0.009)	-0.025*** (0.009)	-0.009 (0.009)	-0.009 (0.009)
Mother's educ	0.061*** (0.021)	0.063*** (0.021)	0.001 (0.017)	0.003 (0.017)	0.025 (0.017)	0.025 (0.017)	0.010 (0.019)	0.013 (0.019)
Mother not working	-0.121 (0.104)	-0.127 (0.103)	-0.198** (0.092)	-0.204** (0.092)	-0.115 (0.094)	-0.119 (0.094)	-0.198** (0.096)	-0.206** (0.096)
G'parent hours	0.013** (0.006)	0.013** (0.006)	-0.007 (0.004)	-0.006 (0.004)	-0.001 (0.005)	-0.001 (0.005)	0.011* (0.006)	0.011* (0.006)
Daycare hours	-0.001 (0.004)	-0.001 (0.004)	0.006* (0.003)	0.006* (0.003)	-0.000 (0.003)	-0.000 (0.003)	0.011*** (0.003)	0.011*** (0.003)
Num siblings	0.010 (0.045)	0.008 (0.045)	0.109** (0.046)	0.107** (0.046)	0.142*** (0.041)	0.141*** (0.041)	0.084* (0.044)	0.081* (0.044)
TV disallowed	-0.037 (0.060)	-0.036 (0.060)	-0.009 (0.055)	-0.008 (0.055)	-0.088* (0.053)	-0.088* (0.053)	-0.017 (0.057)	-0.016 (0.057)
Mother's happiness	0.053* (0.031)		0.053** (0.026)		0.034 (0.030)		0.073** (0.029)	
FE of mother's happiness		0.051 (0.032)		0.053** (0.026)		0.033 (0.030)		0.071** (0.029)
Controls for migrant, single parent and health				Yes for all models				
Controls for child sex, age and health				Yes for all models				
Year dummies				Yes for all models				
n	735	734	742	741	738	737	744	743
Pseudo R-Sq	0.0953	0.0950	0.0754	0.0754	0.0692	0.0691	0.0703	0.0696
AIC	1642.706	1642.223	2466.046	2463.503	2043.739	2041.986	1833.137	1833.077
BIC	1794.502	1793.974	2618.155	2615.567	2195.669	2193.871	1985.334	1985.23
Linktest	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Notes:

1. Here and throughout the remainder of the paper, \*, \*\* and \*\*\* denote statistical significance at the 10%, 5% and 1% levels, respectively, and all standard errors are White adjusted for heteroscedasticity.
2. Unless otherwise stated, data in the paper relate to the years 2007-2010.
3. Controls for migrant, single parent and health are generally not significant and many coefficients associated with child characteristics are significant.



## Appendix E. Models of Child Happiness including Quality of Neighbourhood and Size of Home

Table E1 Models of Child Happiness (2007)

	O Probit	O Probit	2SLS
B Singing	-0.136 (0.288)	-0.122 (0.290)	-0.034 (0.082)
B Walks outdoors	0.431 (0.725)	0.218 (0.647)	0.077 (0.207)
B Painting	-0.129 (0.244)	-0.087 (0.240)	-0.085 (0.078)
B Reading	0.130 (0.349)	0.032 (0.361)	-0.017 (0.113)
B Picture books	-0.374 (0.724)	-0.432 (0.698)	-0.139 (0.259)
B Playground	-0.091 (0.207)	-0.056 (0.207)	-0.014 (0.064)
B Visiting	0.298 (0.229)	0.285 (0.230)	0.074 (0.067)
B Shopping	-0.077 (0.216)	-0.098 (0.216)	-0.040 (0.069)
B TV	-0.036 (0.212)	-0.066 (0.218)	0.002 (0.066)
Child age (mnths)	-0.009 (0.025)	-0.008 (0.025)	-0.006 (0.008)
Child sex (Male=1)	-0.272 (0.212)	-0.280 (0.216)	-0.106* (0.061)
Child hospitalised (Days)	-0.039 (0.056)	-0.057 (0.066)	-0.002 (0.014)
HH equivalent income	-0.057 (0.118)	-0.121 (0.119)	-0.043 (0.036)
East Germany	0.273 (0.285)	0.295 (0.284)	0.101 (0.083)
Good neighbourhood		0.598* (0.359)	0.173 (0.112)
Size of home		0.003 (0.002)	0.001 (0.001)
Mother immigrant	0.109 (0.382)	0.203 (0.405)	0.045 (0.121)
Mother's health	0.164 (0.127)	0.160 (0.129)	
Controls for mother's age, education employment*3	Yes	Yes	Yes
Single parent family	0.390 (0.246)	0.642** (0.288)	0.209** (0.094)
Grandparent hours	0.015 (0.013)	0.016 (0.013)	0.004 (0.004)
Daycare hours	-0.017** (0.008)	-0.019** (0.008)	-0.006** (0.003)
Mother's happiness	0.192*** (0.069)	0.203*** (0.071)	0.139** (0.070)
AIC	263.124	262.966	
BIC	343.9074	350.4814	
Linktest	Pass	Pass	
N	214	214	214

Note: In 2SLS regression, (a) Mother's happiness is instrumented with 'Mother's health'  
 (b) 1<sup>st</sup> stage F-stat=17.35, rejecting the null hypothesis of a weak instrument;  
 (c) Wu-Hausman test fails to reject null hypothesis that variables are exogenous (p-value=0.285).

## Appendix F. Models of Sentence Completion

**Table F1 Models of Sentence Completion**

	OLS Model	OP Model	2SLS Model
Activities (SRV)	0.041*** (0.010)	0.133*** (0.031)	0.091** (0.043)
Child's age	0.024*** (0.004)	0.087*** (0.014)	0.026*** (0.004)
Male child	-0.056* (0.030)	-0.210** (0.105)	-0.042 (0.032)
Hospital days in past 12 mths	-0.017** (0.007)	-0.048** (0.021)	-0.016*** (0.005)
Mother's education	0.020*** (0.006)	0.072*** (0.023)	0.012 (0.008)
Mother not working	-0.079** (0.035)	-0.265** (0.113)	-0.078** (0.034)
Single parent	0.009 (0.037)	0.019 (0.128)	0.027 (0.038)
G'parent hours	0.005*** (0.002)	0.017** (0.008)	0.004** (0.002)
Daycare hours	0.000 (0.001)	0.001 (0.004)	0.000 (0.001)
HH Equiv Income	-0.018 (0.015)	-0.072 (0.056)	-0.024 (0.018)
Year dummies		Yes	
Constant/cut1	-0.647*** (0.176)	4.092 (0.646)	-1.027 (0.369)
n	759	759	745
Adj R <sup>2</sup> / Pseudo R <sup>2</sup>	0.128	0.130	
First Stage Regression			F(2,730)=17.642
Wu-Hausman Test			F(1,730)=1.260 (p=0.262)
Sargan Score			Chi= 2.264 (p = 0.132)

Notes: (i) Dependent variable = talking variable t3, i.e. 'Speaks in full sentences (with four or more words).'  
(ii) Activities SRV = sing + read + visit. (iii) In 2SLS model 'Activities SRV' variable instrumented using 'number of siblings' and 'child not allowed to watch TV alone.'